MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during November, 1884, based upon the reports from the regular and volunteer observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

Under "Areas of low barometer" are described eleven atmospheric depressions, this number being one and eight-tenths less than the average for November during the last eleven years. The average hourly movement of the depressions for November, 1884, is thirty-five and two-tenths miles, which exceeds by five miles, the average hourly movement of the November storms during the preceding eight years. The storms numbered iii. and ix. were the severest that occurred during the month, and were accompanied by dangerous gales during their passage.

The month was unusually warm in the western parts of the country; it was slightly warmer than the average on the Atlantic coast, and slightly colder than the average in the lake region, central Ohio valley and Gulf states.

The precipitation was below the average in nearly all districts, the deficiencies being greatest in the northern and middle Pacific coast regions, and in the Ohio valley and Tennessee; it exceeded the average in Florida and the middle and southern slopes.

In the preparation of this REVIEW the following data, received up to December 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and eighteen Canadian stations, as telegraphed to this office; one hundred and fifty-nine monthly journals; one hundred and sixty-four monthly means from the former, and eighteen monthly means from the latter; two hundred and sixty-six monthly registers from voluntary observers; forty-six monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Alabama, Indiana, Iowa, Louisiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for November, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is exhibited by the isobarometric lines on chart ii. The area of barometric minima, which has occupied the middle and southern plateau districts since April, has now disappeared (an increase in the monthly means over those for October of from .17 to .27 having taken place) and an area of barometric maxima occupies the middle plateau, the mean pressure at Salt Lake City, Utah, being 30.35. The isobar for 30.2 includes nearly the whole of the Rocky mountain region and extends southeastward to central Texas. The area of least pressure is shown over the Gulf of Saint Lawrence, the lowest barometric mean, 29.9, being reported from Father Point, Province of Quebec.

As compared with the preceding month, an increase has occurred in all districts west of the Mississippi river; a slight increase has also occurred in Mississippi, Alabama, Florida, and Wisconsin. If a line were drawn connecting the stations where no change has taken place, it would extend from Marquette, Michigan, through Milwaukee, Wisconsin, and Davenport, Iowa, to central Missouri, and thence southeastward through Memphis, Nashville, and Knoxville, Tennessee, to the south Atlantic coast between Jacksonville and Sanford, Florida. To the eastward of this line the barometric means have decreased, the departures being greatest (from .05 to .09) in the Saint Lawrence valley, lower lake region, New England, and middle Atlantic states, but are not so marked as in the districts where the pressure has increased. At Denver, Colorado, and Salt Lake City, Utah, an increase of .27 has occurred, and between the one hundredth and one hundred and seventeenth meridians, except in southern California, the increase is everywhere above .10, while along the Pacific coast it varies from .01 to .08.

The departures from the normal pressure are exhibited on chart iv., from which it will be seen that along the Pacific coast and over the eastern half of the country the mean pressure for November, 1884, is below the normal, while, over the extreme northwest, southern Texas, eastern Rocky mountain slope, and the western plateau districts it is above the normal. In the table of miscellaneous meteorological data for Signal Service stations will be found the departures for the several stations.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in the upper lake region and northern New England; they were least over the western portions of the country and the Florida peninsula. The extreme ranges are: least, .22 at Key West, Florida, and .32 at Los Angeles, California; greatest, 1.17 at Alpena, Michigan, and 1.20 and 1.34 at Portland and Eastport, Maine, respectively. In the table of miscellaneous meteorological data are given the monthly ranges at various stations.

AREAS OF HIGH BAROMETER.

Five areas of high barometer passed over the districts east of the Rocky mountains, while the barometer remained decidedly above the normal for the month over the plateau regions from the 1st to the 20th and during the latter part of

the month, the pressure declining in these regions during the 21st and 22d, when the second period of high pressure followed and remained until the close of the month, apparently reinforced by a high area from the north Pacific coast. At the close of the month a well-defined area covered the central plateau region. Three of these areas first appeared north of Montana and one passed eastward north of the United States, while the remaining two were apparently secondary areas passing eastward from the mountain regions within the limits of the station of observation.

I.—On the morning of the 1st two depressions were moving eastward from the Missouri valley, one north of the lower lake region and the other central in the upper Mississippi valley, while this large area extended over the mountain districts. The low areas referred to above apparently united during the night of the 1st and passed northeast of New England during the 2d, followed by this high area, which extended over the Ohio valley and was central in the middle Atlantic states at the morning observation of the 3d. The pressure increased at the central stations within this area as it moved eastward, and upon reaching the Atlantic coast the course changed from east to north of east, passing over Nova Scotia, where the barometer rose to 30.50 on the morning of the 4th. This area passed eastward from the central Rocky mountain region, while the barometer continued high in these districts after this area had passed to the eastward.

II.—The morning weather map of the 3d exhibited a high area in the upper Missouri valley, extending southward over the mountain districts as far as New Mexico and northern Texas. The succeeding reports of the 3d indicated that this volume of cold air was moving slowly eastward, reinforced by a cold wave from the regions north of Dakota. On the morning of the 4th the highest barometric readings were observed north of Dakota, while the pressure was from .20 to .40 of an inch above the normal on the eastern slope as far south as Texas. These conditions continued until the 5th, when this area passed almost directly southward over the lower Missouri valley, causing frosts in northern Texas, northern Louisiana, and Georgia on the 6th and killing frosts in the central portions of the Gulf states on the 7th, when the region of greatest pressure included within its area the lower Mississippi valley. This high area did not reach the Atlantic coast, but disappeared by a gradual fall of the barometer in the Southern states, the barometer remaining decidedly above the normal in the Rocky mountain region.

III.—The barometer continued high in the Rocky mountain region from the 7th until the 15th, with no decided movement to the eastward. On the afternoon of the 15th this high area was apparently increased by the advance of a cold wave from the region west of Manitoba. The morning report of the 16th indicated that this condition would extend rapidly over the central valleys and the lake region. On the 17th the crest of this cold wave was apparently in northern Minnesota, but the cold northerly winds extended over the upper lake region and the northwest. At the morning report of the 17th this area extended from the lower lake region to the north Pacific coast and southward to northern Texas, the barometric gradient being greatest in the eastern quadrants. This area passed eastward north of the lake region, crossing the Saint Lawrence valley on the 18th and moving northeastward over the Maritime Provinces on the 19th. The pressure decreased near the centre of this area as it passed over the lake region, and increased as it passed over the Atlantic coast districts.

IV.—This area apparently developed over the southern Rocky mountains during the 18th, and it was probably a secondary area formed from the cold, dry air which passed southward from area number iii. It was at no time well-defined by the isobarometric lines on the weather charts while west of the lower Mississippi river. Killing frosts occurred in central Texas and northern Louisiana on the 20th as this area passed eastward over that section. After reaching the east Gulf states the course of this area changed to the northeast, and it passed over the middle Atlantic states with increasing pressure. On the 22d it was east of New England, when the barometer was .2 of an inch higher than it was within the area when passing over the Gulf states. The movement continued to the northeast during the 23d, when this area disappeared to the eastward of Nova Scotia.

V.—This area appeared north of Dakota on the 22d, and continued central in that region on the 23d, when the temperature ranged from —10° to —27°. This was the most severe cold wave of the month, the temperature falling from 30° to 50° in twenty-four hours at numerous stations in the Mississippi and Ohio valleys, and as low as freezing in northern Louisiana on the 24th. This high area passed directly south from Manitoba to Indian Territory, and thence eastward over the Gulf and south Atlantic states, attended by light frosts in northern Florida and killing frosts in southern Alabama on the 25th. From the 25th until the close of the month a high area extended over the plateau regions, and this area was increased by the advance of a second high area from the north Pacific coast region on the 26th.

AREAS OF LOW BAROMETER.

Eleven areas of low barometer have been traced on the tri-daily weather maps of November. They were generally first observed on the eastern slope of the Rocky mountains in high latitudes. Three developed within the limits of the stations; one was an Atlantic storm apparently passing northward, following the general course of the Gulf stream; and they all passed towards the Saint Lawrence valley or the Maritime Provinces, carrying the mean latitude of these disturbances for the month to the northward of the average storm-tracks for November. Of the storms traced from the lower latitudes it is observed that they have a more northerly course than the storm-tracks of the preceding month.

The following table gives the latitude and longitude in which each area of low barometer was first and last observed, with the average hourly velocity while within the regions of observation:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	47 00	99 00	47 00	58 00	32.0
II	42 00	101 00	47 00	82 00	41.0
III	36 00	93 00	48 30	64 00	29.5
IV	51 00	98 00	46 00	80 00	22.5
V	50 00	87 00	51 00	65 00	36.0
VI	52 00	98 00	44 00	63 00	34.0
VII	54 00	105 00	48 00	78 00	29.0
VIII	39 00	67 00	44 00	69 00	33.0
IX	38 00	102 00	50 00	65 00	30.0
X	49 00	106 00	47 30	77 00	50.0
XI	27 00	95 00	49 00	61 00	50.0
Mean hourly velocity, November, 1884					35.2
Mean hourly velocity for November for last eight years					30.2

I. and II.—Number i. developed in the upper Missouri valley on the 30th of October, and passed directly eastward over the upper lake region during the 31st, first inclining slightly to the southward, and after passing Lake Michigan, changing to the northward until its centre reached latitude 49° in the Saint Lawrence valley, when the course changed slightly to the southward, crossing the Saint Lawrence valley and passing to the southward of Newfoundland. The a. m. chart of the 1st exhibited two well marked depressions—number i. central north of Lake Ontario and number ii. central near Davenport, Iowa; the former had been traced during the two preceding days from Dakota and the latter from western Nebraska. These low areas moved eastward during the 1st, and number ii., after passing to the lower lake region, united with number i. in the lower Saint Lawrence valley at midnight of the 1st. Light showers occurred in the northern districts east of the Missouri valley while these depressions were passing eastward, and fresh to brisk winds were reported from the stations on the lower lakes, but no marked disturbance was observed.

The observer at Eastport, Maine, reports that high northeasterly winds (maximum velocity thirty-four miles) prevailed during the 2d, and that the schooner "Alaska" had main sail split and was left in a helpless condition near the shore off Head Harbor, New Brunswick. Twenty schooners remained in harbor at Eastport during the signal display for this storm.

III.—This storm developed in northern Arkansas on the afternoon of the 3d, while extended high areas were observed on the Atlantic coast and in the Rocky mountain regions. It increased in energy rapidly, moving to the northeast between the high pressure areas above referred to, attended by general rains in the lake regions and the central valleys. These rains extended to the Atlantic coast by the morning of the 4th, the precipitation being very heavy north of Cape Hatteras, North Carolina. After passing over the lower lakes this depression divided, forming a secondary storm in southern New England while the principal disturbance passed down the Saint Lawrence valley, the two areas uniting at midnight of the 5th, north of New England. Dangerous gales occurred in the lake region and on the middle Atlantic and New England coasts on the 4th and 5th, the wind reaching a velocity of fifty-two miles an hour at Buffalo and at Sandy Hook, and gales occurred generally throughout the Maritime Provinces on the 5th. This storm was followed by a second disturbance from Manitoba on the 6th, which passed rapidly to the eastward north of the lake region, causing dangerous winds on the 7th, a velocity of fifty-six miles an hour occurring at Buffalo when this secondary depression extended over the lower Saint Lawrence valley.

The following notes from the reports of Signal Service observers relate to this storm:

Escanaba, Michigan, 5th: the wind blew with more or less severity during the day, a velocity of thirty miles being recorded both before and after noon; no damage resulted from the storm in this vicinity.

The signal displayman at South Haven, Michigan, reports that the schooner "Anna Thorine" went ashore at 4 a. m. on the 6th, while attempting to enter that harbor.

Rochester, New York, 4th: brisk southeasterly wind at 11.35 a. m., veering to southerly and increasing in force until 1.10 p. m., when a velocity of forty miles per hour from the south was recorded. High winds also prevailed on the 5th from 2 to 7.30 a. m., a maximum velocity of thirty-nine miles, west, occurring at 4.35 a. m. On the 7th brisk southwesterly winds occurred, veering at 9.45 a. m. to high westerly and increasing in force; maximum velocity forty-eight miles, west, at 1.45 p. m.; wind velocity fell below twenty-five miles at 7.15 p. m.

Oswego, New York: the three-masted schooner "Agnes Hope," lumber-laden, lost her deck load, filled with water, and was abandoned when about fifteen miles out from this port, at 3. p. m. on the 6th.

The observer at Eastport, Maine, reports that fifteen schooners remained in that harbor during the signal display for this storm.

Reports from Father Point state that the storm during the night of the 4–5th was of unusual violence. The high sea inundated the fields in all the parishes along the coast, and several buildings near that place were carried away. The town of Rimouski was inundated, and a large number of barns, stables, and wharves were carried away. The losses sustained at Rimouski are estimated at $30,000. At Saint Anne de Monts fifteen houses were destroyed, and a considerable quantity of wood was swept away. A number of fishing boats were totally demolished, having drifted on the rocks. At Notre Dame du Portage three houses were swept away.

The following extract is from the "New York Herald" of November 6th:

HALIFAX, N. S., November 5, 1884.—Early this morning a violent storm set in from the southwest and continued until noon with much severity. The rain came down in torrents, and the greater part of the time a small hurricane was blowing. No special damage to shipping in dock has been reported, except that some vessels were badly chafed. In the Northwest Arm the water was exceptionally high, coming right up on the road. Shipowners are somewhat anxious, as it is feared that vessels near the coast may have suffered.

IV.—This was a low area of slight energy which appeared in the Northwest Territory on the 8th; it passed over Manitoba on the 8th, and southeastward over Lake Superior on the 9th, causing no marked change in the weather conditions in the United States. This area was at no time enclosed by isobars within the limits of the stations, and after the p. m. report of the 10th, it apparently passed to the north of the lower lake region.

V.—This area appeared farther to the north than the preceding one (number iv.), and the centre could be only approximately determined at the successive reports from the 12th, 3 p. m., until the midnight report of the 13th. It caused but slight changes in the weather conditions within the United States, but developed considerable energy while passing to the eastward over the Canadian stations. The easterly movement was retarded when this depression reached the Gulf of Saint Lawrence, and strong northwest gales occurred in the lower Saint Lawrence valley on the 15th.

VI.—This was first located as central in Manitoba on the afternoon of the 15th. It passed rapidly over the lake region, upper Saint Lawrence valley, and New England during the 16th and 17th, and disappeared northeast of Nova Scotia. The barometer fell at the centre of this depression as it moved eastward, and the strongest winds occurred after they had shifted to the northward.

The Signal Service observers report the following in connection with this storm:

Escanaba, Michigan, 16th: the wind reached a velocity of twenty-five miles per hour from the south, at 8.30 p. m., and continued high during the night, a velocity of thirty-one miles northwest, occurring at 1.34 a. m. on the 17th. The propeller "Merrimac" arrived during the morning of the latter date, and reported that on Lake Michigan the wind blew with a velocity of not less than fifty miles per hour.

Alpena, Michigan, 17th: high winds prevailed during the morning, a maximum velocity of twenty-seven miles per hour from the northwest having been recorded. The schooner "Thomas P. Shelton" went ashore on Middle Island during the storm, but sustained no serious injury.

Port Huron, Michigan, 17th: high northwesterly winds began about 4 a. m. and continued with more or less severity during the day; a maximum wind velocity of twenty-eight miles per hour occurred at 2.37 p. m. During this storm on Lake Huron all vessels in this port were detained; the schooner "Frank Morris," when off Forester, Michigan, had two of her crew swept overboard.

A storm passed northward east of Cape Hatteras on the 16th, causing unusually heavy rain on the North Carolina coast and wind velocities ranging from thirty-six to forty-eight miles an hour from the north, backing to westerly, thus showing the northerly movement of the storm which passed to the east of the coast.

The following extract is taken from "Science" for December 19, 1884:

The American brigantine "Senorita" was in latitude 35° 50′ north, longitude 74° 12′ west, at meridian, November 16, and experienced the severe storm of that date. About 2 p. m. when it was blowing very hard from the northeast, five whirlwinds were seen to the southward and eastward. They were black columns of water about four hundred feet in diameter, and their tops seemed to reach the clouds. They moved with great velocity at right angles with the wind, and, after passing the vessel, disappeared to the northward and westward. Four went ahead of the vessel, and one astern, within half a mile. The whirlwinds were moving at the rate of twenty-five or thirty miles an hour. The appearance of waterspouts in the midst of a gale, and moving at right angles to the wind, is quite unusual.

VII.—This disturbance was probably central north of Montana on the afternoon of the 18th. It moved rapidly to the southeast over Manitoba and Lake Superior during the 19th, followed by a decided fall in temperature and light snows. The barometer was lowest near Marquette, Michigan on the morning of the 20th, although it had risen at the centre dur-

ing the southeasterly movement of the area. This storm was not severe in any district, although dangerous winds occurred at several stations in the lake region. After passing over Lake Superior this area became less clearly defined and could no longer be traced on the tri-daily charts.

VIII.—This depression could not be definitely traced from the observations taken at land stations, but the reports indicate that a storm of considerable energy passed northeastward along the Atlantic coast about the 20th. On the 19th the barometer was high in the northeast and a steep barometric gradient was observed to the south of Nova Scotia, and a high wind of forty-two miles per hour from the northeast occurred at Block Island, Rhode Island. The centre of the storm was probably near latitude N. 40°, longitude W. 67°.

IX.—On the 21st the barometer was low in all districts on the Pacific coast, in the plateau regions, and generally in the mountain regions south of Montana, while a high area extended over the states east of the Mississippi river. This area was first observed at the afternoon report of the 21st central in eastern Colorado. It developed rapidly and passed to the Missouri valley by the morning of the 22d, passing between the high area to the east and a second cold wave which extended over the northwestern districts from Lake Superior to Idaho. This storm was apparently pushed to the southward by the cold wave during the eight hours between the morning and afternoon reports of the 22d, but it extended in a trough-like form, from the upper lake region to the west Gulf coast. Very heavy rains occurred to the south and east of the centre of this area when in the Mississippi valley, and cold northerly winds with snow, followed in the northwest quadrant of this storm as it passed over the lake region. This storm was the most violent of the month in the lake region, and it was followed by a cold wave which closed navigation on the canals in New York and at a number of lake ports. Rain turned to sleet and snow as the centre passed to the northeast and the winds increased in force after shifting to the west; the highest velocity reported was sixty miles per hour at Buffalo, New York. This low area followed the general course of the Saint Lawrence valley, but was of such energy as to cause dangerous northwest gales on the Atlantic coast north of Cape Hatteras, when the centre was north of Halifax, Nova Scotia, on the 24th.

Concerning this storm the following notes have been reported by the Signal Service observers.

Galveston, Texas: the barometer fell rapidly on the 22d, the lowest reading (29.64) being observed about noon; at 1 p. m. it read 29.76; and at 3 p. m., 29.71. After 10 a. m. the wind shifted to northwest and reached a velocity of thirty-seven miles per hour at 11.42 a. m.; the velocity fell below twenty-five miles per hour at 12.14 p. m.

Louisville Kentucky: heavy rain fell during the early morning of the 22d, and a wind velocity of thirty-six miles per hour was recorded at 9.45 a. m.

Duluth, Minnesota, 21st: light snow began at 9.10 a. m., continuing all day and during the 22d, with high northeast to northwest winds on the latter date, a maximum velocity of forty miles per hour occurring at 9.30 p. m.

Escanaba, Michigan, 23d: at 2.20 a. m. the wind shifted to northwest; it afterwards increased in force and continued throughout the day; a velocity of thirty-two miles per hour from the northwest occurred both before and after noon. Several vessels put into this port during the storm, and reported unusually rough weather on the lake.

Milwaukee, Wisconsin, 23d: a northwesterly gale began at 5.17 a. m. and continued all day; it was very severe on Lake Michigan, but, owing to the lateness of the navigation season, a comparatively small number of vessels were caught in the storm, although several put into this port, some having sustained damage. The signal for this storm was displayed on the 21st; it was justified by a velocity of forty-one miles per hour and gave ample warning to vessels and others interested.

Grand Haven, Michigan 23d: about 9.30 a. m. the wind shifted to northwest, increasing in force and attaining a velocity of thirty-nine miles at 12.06 p. m. The propellers "Michigan" and "Wisconsin" left this port for Milwaukee, but were compelled to return, the "Michigan" sustaining damage estimated at $2,500.

Detroit, Michigan, 23d: a southeasterly storm began at 12.04 a. m., continuing during the night and following day; the wind reached its greatest force, forty miles, southeast, at 6.54 a. m.; at 12.30 p. m. the wind shifted to southwest and later to west, moderating at 6 p. m., but during the night of 23–24th it increased in force and continued high until 11 a. m. of the latter date.

Toledo, Ohio, 22d: after 11 p. m. the wind blew in gusts of considerable violence and continued to increase in force; at 4.54 a. m. on the 23d it reached twenty-five miles per hour, and afterwards blew in violent gusts, the maximum velocity, forty miles per hour from the southwest, occurring at 12.49 p. m.; the wind continued high until 9.20 p. m., when it subsided. This storm was of unusual severity and caused much damage. In Toledo, buildings were unroofed and trees blown down, while in the surrounding country the corn shocks were scattered, and telegraph lines, fencing, etc., were prostrated. The cautionary signal for this storm was displayed fourteen hours in advance of it, and it was due to this, in a great measure, that no marine disasters occurred.

Buffalo, New York, 23d: the storm of this date was the severest that has occurred here for several years; it began with a south wind at 12.18 a. m., which continued with great force, reaching a velocity of forty-nine miles per hour at 8.15 a. m. The barometer fell during the day until shortly after 3 p. m., being at that hour 29.43. The wind then suddenly veered to west, increasing in force and attaining a velocity of sixty miles per hour; the wind continued high until about 4.40 a. m., on the 24th. A large amount of damage was done along the docks, and throughout the city, signs, trees, etc., were blown down; numerous buildings were unroofed or otherwise damaged. A large new church building was unroofed and the front blown in, causing a loss of $20,000. Captains of vessels and others state that the warning given for this storm prevented many disasters, and that the storm was one of the severest ever experienced at this place.

Rochester, New York, 23d: high southerly, veering to westerly winds prevailed during the morning, the highest velocity, forty-four miles per hour from the south, having occurred at 10 a. m.; the winds continued high until the early morning of the 24th.

The observer at Norfolk, Virginia, reports that several steamers remained in port on the 23d during the signal display, which was justified by a wind velocity of twenty-five miles per hour from the south.

At New York City a strong westerly gale prevailed from 2.25 to 9.17 p. m., of the 23d, the wind attaining a velocity of forty miles; many minor disasters occurred; steamers were delayed and telegraphic communication seriously interrupted.

Reports from Bridgeport, Connecticut, state that the storm on the evening of the 23d was the severest experienced for many years. Similar reports are also received from other towns in Connecticut, Rhode Island, and Massachusetts. At Ellsworth, Maine, several schooners dragged anchor.

The observer at New London, Connecticut, reports that a southeasterly gale began at 10.50 a. m., reaching its height at 11.20, when a wind velocity of forty-nine miles was recorded, causing vessels in the harbor to break from their anchors. This was one of the severest storms that has occurred for several years. The observer also states that the cautionary signal gave ample warning of its approach and that the display was favorably commented upon by ship-masters and ship-owners.

The observer at Boston reports as follows: The gale began at 1.49 p. m. on the 23d and continued until 7 p. m. on the 24th; considerable damage was done in this city and vicinity, telegraph lines and trees being prostrated. No marine casualties were reported; the timely warning of the storm's approach

given by the storm signal detained many vessels in this harbor, the signal having been displayed twelve hours in advance of the storm; the highest velocities of the wind recorded were forty-seven miles, south, at 11.54 p. m. on the 23d, and forty-four miles, south, at 1.30 a. m. on the 24th.

On the summit of Mount Washington, New Hampshire, the most violent hurricane that has occurred since last winter prevailed on the 23d. The wind blew with great violence from the south all day, reaching a velocity of 128 miles per hour during the night; the hurricane abated during the early morning of the 24th.

X.—This disturbance was first observed in the upper Missouri valley at the afternoon report of the 24th. The succeeding report showed a slight depression in southeastern Dakota, and during the following eight hours, a slight depression passed over the upper lake region, attended by light snow north of the Ohio valley. This storm was not severe in any section of the United States, although general snow fell in the northern districts, and numerous high winds were reported from the lake region, the velocity at Buffalo reaching forty miles per hour. This storm apparently passed northward, beyond the limits of stations, on the 26th.

XI.—The morning reports of the 27th indicated the speedy development of a storm in the western part of the Gulf of Mexico, and the succeeding reports of that date showed the northeasterly movement of the storm, the centre at midnight being near New Orleans, and the cold wave which was approaching from the northwest had reached Indianola, Texas, causing a "norther" in that region. This storm extended rapidly to the northeast over the Southern, middle Atlantic, and New England states, causing heavy rains and high winds on the coast. It followed the general direction of the coast line after passing over the south Atlantic states, the depression being much elongated in the direction of the movement. The barometer fell rapidly as the storm passed to the northeastward and when last observed, on the afternoon of the 29th, it had fallen to 29.06 at Anticosti, which, at that time was near the centre of disturbance.

NORTH ATLANTIC STORMS DURING NOVEMBER, 1884.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0-10.]

The paths of the depressions that have appeared in the north Atlantic ocean during the month, are determined, approximately, from reports of observations furnished by captains and agents of ocean steamships and sailing vessels; from data obtained through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to December 23d, 1884.

The observations used are, in general, simultaneous, having been taken each day at 7 a. m. Washington, or 12 hrs. 8 m. p. m. Greenwich mean time.

Nine depressions are shown on the chart for November, 1884; of these, four, viz: numbers 2, 3, 8, and 9, are continuations of storms which first passed over the United States and Canada, and are partly described, under "areas of low barometer," in this REVIEW. One depression appeared in the region between N. 30° and 35°, and W. 70° and 75°, and passed northeastward, causing heavy rains and gales on the coast of the Carolinas. The remaining depressions developed over the Banks of Newfoundland, or in mid-ocean. Only one storm, number 1, appears to have reached the British Isles from the Atlantic; the others either filled in, or passed far to the northward of those islands.

During the first and second decades of November, 1884, the weather over the north Atlantic north of 40° N. was marked by a succession of moderate to strong gales from s. to nw.; with rain or sleet and high seas; during the last decade, strong breezes, increasing to gales at the close of the period, prevailed; as a whole, however, the weather was not more stormy than is usually experienced in the north Atlantic during the month of November.

During the greater part of the month an area of high barometer appears to have existed near the European coasts and to have spread westward over the Atlantic ocean for a considerable distance, and fine weather, with light to moderate easterly winds prevailed over the region south of the fortieth parallel and from the European coast westward to about 35° W.

The following descriptions refer to the depressions charted:

1.—On the 1st an area of low barometer, at the centre of which the pressure was less than 29.5 (749.3), was to the southward of Newfoundland, causing strong easterly gales along the southern coast of that island, with moderate to strong s. and se. gales between W. 55° and 60°, and moderate northerly winds in Nova Scotia. Some loss of life and much damage to shipping occurred along the Newfoundland coasts during the prevalence of those gales. On the 2d the depression having moved rapidly northeastward, was shown near N. 53° W. 37°, where the lowest pressure reported was 29.53 (750.0); strong winds to moderate gales occurred in all quadrants. The reports indicate that a rapid decrease of pressure occurred during the 2d, and by the 3d the barometer at the storm-centre, near N. 54° W. 27°, was below 29.0 (736.6), and the winds had increased to strong gales. The following reports show the violence of this storm:

Captain G. Cochrane, commanding the s. s. "The Queen," reported: "November 2d, 8 p. m. Greenwich time, lat. 49° 44′ N., long. 18° 25′ W., barometer 30.05 (763.3), wind backing to southward and rapidly increasing, with gusts; barometer falling; midnight, fresh gale from sse. and backing to se. with confused sea. November 3d, 3 a. m., barometer 29.35 (745.5); wind suddenly shifted in a heavy squall with rain, to ssw., and gradually hauled to wsw.; by 8 a. m. it was blowing a fresh gale with high sea, barometer still falling slowly after the shift of wind. At noon, lat. 49° 28′ N., long. 22° 47′ W., strong gale with fierce squalls and very heavy wsw. sea; 4 p. m., weather the same, barometer 29.17 (740.9); at 8 p. m. wind w., but no abatement in the fury of the gale and a tremendous sea running; midnight, still blowing furiously with very heavy and dangerous westerly sea running, barometer steady since 4 p. m. At 4 a. m. of November 4th wind hauling to wnw., barometer rising slowly, weather settling into a strong wnw. gale and squally, with heavy wnw. sea running; noon, lat. 49° 12′ N., long. 25° 17′ W., gale moderating and sea going down."

Captain W. P. Couch, commanding the s. s. "Ontario," between N. 56° 38′, W. 24° 32′, and N. 55° 55′, W. 31° 00′, reported: "November 2d, 17 hrs. 40 m., barometer began to fall rapidly, the wind increasing till noon, when it was blowing a strong gale with high sea from e. ¾ s., barometer 28.82 (732.0), with rain and dull weather; at 3 hrs. 40 m. of the 3d, wind shifted to s. ¼ w., and moderated suddenly; 5 hrs. 40 m., light airs and calms, barometer 28.77 (730.7), until 10 hrs. 44 m., when the breeze sprang up from n. ½ e., increasing to a gale of force 8, with confused sea and rainy weather; at noon barometer rising and wind decreasing to a fresh breeze, barometer 29.66 (753.7)."

Captain Laub, commanding the s. s. "Thingvalla," reported, "November 2d, in N. 54° 15′, W. 33° 50′ at 8 p. m., (ship's time) barometer 29.25 (742.9) wind ese. force 9, high nw. sea, rain; 9 p. m. 29.16 (740.7) wind ese. 10, high nw. sea, rain; 10 p. m. 29.07 (738.4), wind e. by s. 10, sea going down; 11 p. m. 29.00 (736.6), wind e. 10; midnight, 28.92 (734.6), wind e. by n. 8. November 3d, 1 a. m. barometer 28.86 (733.0), wind e. by n. force 7, confused sea; 4 a. m. 28.69 (728.7), wind ne. by e. force 5, confused sea; 6 a. m. 28.55 (725.2), wind ne. by n. 7, confused sea; 8 a. m. 28.46 (722.9), wind ne. by n. 7, high and long sea-swell from s.; 10 a. m. 28.54 (724.9), wind ene. force 3, same sea-swell; noon, (N. 54° 58′, W. 30° 40′), barometer 28.54 (724.9), wind e. force 5; 5 p. m. barometer 28.55 (725.2), wind nne. force 6; 8 p. m. 28.62 (726.9), wind n. force 6; midnight, 28.62 (726.9), wind n. 6. November 4th, 6 a. m. barometer 28.66 (728.0), wind nnw.; noon, 28.71 (729.2), wind nnw, (N. 55° 57′ W. 24° 34′).

During the 3d, vessels between N. 45° and 55° and from W.

25° eastward to the European coasts, had heavy southerly gales, shifting during the day to westerly; the pressure over the above region ranged from 29.0 (736.6), to 29.8 (756.9). On the 4th, the depression was near the northwest coast of Ireland, the lowest reported barometric reading being 29.23 (742.4).

2.—This was a continuation of the depressions described as numbers i. and ii. under "Areas of low barometer." During the 2d, it passed eastward over the southern part of the Gulf of Saint Lawrence, and thence northeastward over eastern Newfoundland. By the 3d, it had passed to the eastward of the fiftieth meridian, and probably became merged in low area 1, which then occupied the ocean north of the fiftieth parallel.

3.—This was a continuation of the depression described as low area iii. under "Areas of low barometer." During the 6th, it moved northeastward over the Gulf of Saint Lawrence towards the Strait of Belle Isle, and on the 7th, the storm-centre was near N. 53°, W. 47°. The s. s. "Ontario," W. P. Couch, commanding, reported: "6th, 1 hr. 00 m., wind ese. with hail showers, barometer falling from 30.04 (763.0) to 29.01 (736.8) at 11 hrs. 36 m.; the wind veered to sw., blowing strongly, with high confused sea; barometer still falling until 0 hr. 46 m. of the 7th, (near N. 53° 13′, W. 49° 00′), when it read 28.52 (724.4); the wind then suddenly shifted to nw. ½ w., and increased to a fresh gale with hail squalls; the barometer then began to rise and the wind moderated." During the 7th, strong w. winds to moderate gales prevailed over the Banks of Newfoundland; on the 8th, the region of least pressure was shown near N. 55°, W. 28°. Between the meridians of 15° and 30° west longitude, and from N. 45 to 52°, the barometric readings ranged from 29.38 (746.2) to 29.73 (755.1), and heavy ssw. to w. gales occurred over that region, several steamers sustaining damage to deck fittings. During the 8th, the depression was apparently forced to the northward beyond the field of observation, and the pressure over the ocean between W. 15° and 25° and south of N. 51°, increased to 30.0 (762.0) while a decrease of pressure had set in over the region west of the thirtieth meridian.

4.—The observations for the 9th showed an extensive area of low barometer, occupying the ocean from the Banks of Newfoundland northeastward to the thirtieth meridian, and over this region the barometric readings ranged from 29.3 (744.3) to 29.7 (754.4), with strong s. to w. breezes or moderate gales. On the 10th the disturbance was central near W. 25° and between N. 50° and 55°; vessels on the fiftieth parallel and southward to N. 45° had strong winds to moderate gales from w. and nw., with barometer ranging from 29.18 (741.2) to 29.65 (753.1); to the eastward of W. 25° the winds were southerly, blowing with the force of a moderate or fresh gale. During the 10th there was an increase of pressure over the region to the eastward of W. 20°; this increase apparently extended westward during the 11th and 12th, and the area of low barometer was forced to the northwestward and beyond the field of observation.

5.—This depression occupied the Gulf of Saint Lawrence and southern Newfoundland on the 12th, with pressure near the centre about 29.6 (751.8). During the 12th the depression moved eastward with decreasing pressure and on the following day it was shown near N. 47°, W. 43°, in which region the barometer ranged from 29.08 (738.6) to 29.3 (744.2); moderate to fresh nw. gales occurred over the Banks of Newfoundland and eastward to W. 43°, while fresh s. gales prevailed to the eastward of that meridian. The s. s. "Aurania," W. H. P. Hains, commanding, reported: "on the 12th at 14 h'rs 33 m., in N. 47° 43′, W. 39° 32′, moderate sse. breeze, barometer 29,82 (757.4); 16 h'rs 37 m., barometer 29.61 (752.1); 18 h'rs 41 m., rain began to fall, wind increasing, barometer 29.48 (748.8); 20 h'rs 45 m. strong wind veering to s. and w., thick, rainy weather, barometer 29.26 (743.2); at 22 h'rs 49 m., wind sw., barometer 28.94 (735.1), minimum reading; at 23 h'rs 51 m., barometer 29.01 (736.8), wind suddenly flew to nw. and increased rapidly, with high sea; 13th, 00 h'rs 53 m., fresh gale, barometer 29.08 (738.6); 2 h'rs 55 m., strong nw. gale, barometer 29.18 (741.2), position N. 46° 42′, W. 43° 49′; at 4 h'rs 59 m., barometer 29.38 (746.2); at 7 h'rs 3 m., gale moderating."

The depression extended southward and eastward to N. 44°, W. 35°, vessels in that neighborhood having encountered strong s. gales with pressure about 29.5 (749.3). By the 14th the area of low barometer was transferred to about N. 54°, W. 30°, the lowest reported reading being 29.28 (743.7); an area of high barometer occupied the region east of the thirtieth meridian, and during the 14th the depression probably filled in.

6.—This depression appeared off the eastern coast of Newfoundland on the 15th, the pressure having decreased about .6 inch since the observations of the 14th. Moderate w. gales occurred over the region between W. 60° and 45°, and from N. 42° to 48°; while strong s. and sse. gales prevailed from N. 50°, W. 45° southeastward to N. 40°, W. 38°. During the 15th the depression moved in a course slightly to the south of east, and on the 16th it was shown as an extensive disturbance central near N. 48°, W. 39°, its centre, where the pressure was less than 29.1 (739.1), being indicated clearly by the well-defined cyclonic movement of the winds in that region. This disturbance was felt as far south as the fortieth parallel; the ship "E. J. Spicer," D. Spicer, commanding, in N. 43° 26′, W. 37° 58′, had a wsw. gale of force 8, with thunder and heavy rain, barometer 29.31 (744.5); and the ship "Ariel," F. Schwings, commanding, in N. 39° 57′, W. 38° 32′, had a gale from sw., veering to w. and nw., and increasing to almost hurricane force, with heavy rain; lowest barometer 29.26 (743.2). By the 17th the pressure had increased to 29.8 (756.9) over the region between N. 40° and 50° and W. 30° and 40°, while an area of high barometer began to spread westward over the ocean north of the forty-fifth parallel.

7.—This depression appeared near the Carolina coast on the 16th, and displayed considerable energy during its passage northeastward. On the 16th it was central near N. 33°, W. 73°, the lowest reported barometer reading being 29.29 (744.0); it began with a southeast gale of force 7, and increased in force as the wind shifted to w. and nw., until it reached hurricane force, and continued for several hours. As it approached the coast it caused heavy rains at Hatteras and other stations on the Carolina coast.

The following vessels encountered the storm: s. s. "State of Texas," off Cape Hatteras, reported "sudden cyclone, wind blowing with extreme violence for twelve hours; heavy rainfall." Off Hatteras, schooner "Nelly," cyclone lasting eighteen hours; lost and split sails, had decks swept and sustained other damages; brig "Daisy Boynton," in N. 34° 40′, W. 74° 00′, had hurricane from wsw.; decks swept, lost sails and spars and sprung a leak; bark "B. F. Watson," in N. 34° 30′, W. 72° 30′, short, severe gale from wsw. to nw.; schooner "Isle of June," in N. 34° 30′, W. 75° 00′, nw. gale lasting twenty-four hours; schooner "Viola Reppard," L. Ogier, commanding, reported in N. 33° 14′, W. 72° 00′, barometer 29.7 (754.4) wind se., force 8.

Captain J. C. Wiltbank, commanding the schooner "Geo. W. Lochner," reported as follows: "15th, (about N. 33° 55′, W. 75° 41′) 8 p. m., barometer 29.94 (760.5), strong ene. gale; midnight, wind n., heavy; 4 a. m. of the 16th, wind shifted to se., barometer 29.64 (752.8); 6 a. m., wind shifted to nne. with hurricane force and very high cross sea, barometer 29.54 (750.3); kept ship before the gale; 8 a. m., very heavy rain, wind nnw. with terrific squalls; 11 a. m., barometer 29.34 (745.2); 12 m., winds from w. to nw., barometer 29.29 (744.0); 4 p. m., squalls moderating, barometer rising slowly; midnight, gale breaking, weather still squally with very high sea, barometer 29.59 (751.6)."

The depression moved northeastward along the coast and on the 17th it was central near N. 39°, W. 70°, causing strong ne. to nw. gales off the middle Atlantic and New England coasts. On the 18th the depression was central near N. 44°, W. 56°, having been joined, off the coast of Nova Scotia, by

the depression described as number vi. under "Areas of low barometer." Near the centre of the combined depressions the the pressure was about 29.5 (749.3). During the 19th and 20th the depression moved eastward, attended by increasing pressure and strong breezes to moderate gales; by the last-mentioned date it had apparently filled in and an area of barometric maxima occupied the ocean from the Banks of Newfoundland eastward to the European coasts.

8.—This was a continuation of the depression described as number viii. of "Areas of low barometer." On the 21st it was central south of Newfoundland, the pressure ranging from 29.6 (751.8) to 29.75 (755.6); the disturbance moved northeastward, and during the 22d, 23d, and 24th it occupied the region between N. 50° and 55° and W. 40° and 35°, while an area of high barometer prevailed over the ocean to the eastward of the last-mentioned meridian; moderate w. gales prevailed on the fiftieth parallel during the above dates, and by the 25th the depression had disappeared from the chart.

9.—This was a continuation of low area ix. of "Areas of low barometer." It passed over the Gulf of Saint Lawrence during the 24th, and on the following day it was to the northeastward of Newfoundland, where it probably filled in. By the 26th the area of barometric maxima, within which the barometer ranged from 30.15 (765.8) to 30.55 (776.0), covered the Atlantic from W. 50° eastward to W. 10°.

OCEAN ICE.

The positions of the icebergs observed during November, 1884, are shown on chart i. by the shaded spots.

The following reports were received:

October 30th.—S. S. "Persian Monarch," in N. 46° 29′, W. 53° 24′, passed two icebergs.

November 17th.—S. S. "Lord Clive," in N. 45° 56′, W. 53° 38′, passed a number of icebergs.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for the month of November, 1884, is exhibited on chart ii. by the dotted isothermal lines. In the table below are shown the mean temperatures for November, 1884, with the November normals and the departures in the several geographical districts, as deduced from the Signal Service observations.

Average temperatures for November, 1884.

Districts.	Average for Nov. Signal-Service observations.		Comparison of Nov., 1884, with the average for several years.
	For several years.	For 1884.	
	°	°	°
New England	40.1	40.7	+0.6
Middle Atlantic states	45.8	46.4	+0.6
South Atlantic states	55.2	56.1	+0.9
Florida peninsula	67.1	66.8	−0.3
Eastern Gulf states	55.9	54.5	−1.4
Western Gulf states	56.3	56.0	−0.3
Rio Grande valley	64.4	65.0	+0.6
Tennessee	48.4	48.6	+0.2
Ohio valley	43.3	44.3	+1.0
Lower lake region	37.8	37.5	−0.3
Upper lake region	23.0	33.6	−0.4
Extreme northwest	23.9	27.0	+3.1
Upper Mississippi valley	38.3	40.1	+1.8
Missouri valley	33.1	36.0	+2.9
Northern slope	29.7	37.1	+7.4
Middle slope	37.0	40.9	+3.9
Southern slope	50.6	51.5	+0.9
Southern plateau	49.2	53.2	+4.0
Northern plateau	49.1	52.6	+3.5
North Pacific coast region	43.9	47.0	+3.1
Middle Pacific coast region	52.8	55.5	+2.4
South Pacific coast region	58.7	60.4	+1.7
Mount Washington, N. H	16.8	16.8	Normal
Pike's Peak, Colo	8.1	13.3	+5.2
Salt Lake City, Utah	38.4	42.1	+3.7

On chart iv. the departures are graphically exhibited by lines connecting stations where the departures coincide. From this chart it will be seen that the month of November has been warmer than the average over nearly the whole country. In the Gulf states, (except along the coast of Texas, south of Indianola) and in southern Florida, the month has been colder than the average; the mean temperature has also been below the normal in southeastern Tennessee and over portions of Virginia, West Virginia, Kentucky, Ohio, and from the upper lakes eastward to the Saint Lawrence valley; slight deficiencies in the mean temperature are also shown over northern New Jersey, northeastern Pennsylvania and the western portions of Connecticut and Massachusetts. The stations reporting the greatest departures below the normal temperatures are as follows: Mobile, Alabama, 3°.0; New York City, 2°.5; Pensacola, Florida, 2°.2; Alpena, Michigan, 2°.1. Along the New England coast, from southern New Jersey to northern Georgia, and over the western districts the mean temperatures have been above the normal, the departures exceeding 5° over portions of Arizona, New Mexico, Colorado and Utah, while in Montana they vary from 5° to 11°. In the table of miscellaneous meteorological data will be found the departures from the normal for the several stations of the Signal Service.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for November, 1884; in the table of miscellaneous meteorological data, and on chart iv. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, 47°.4, is 0°.4 below the November average for the last three years.

Illinois.—Anna, Union county: mean temperature, 47°.4, is 2°.0 above the November average for the last nine years.

Riley, McHenry county: mean temperature, 32°.8, is 0°.3 below the November average for the last twenty-four years. The mean daily temperature from 1st to 22d, averaged 38°.0; and from 22d to 30th, it averaged 18°.4. The first half of the month was warmer than any corresponding period during the last twenty-four years. The mean temperature for the autumn of 1884, is 49°.8, or 3°.1 higher than the mean for the last twenty-three years; only the autumns of 1865, 1867, 1870, and 1882, were warmer, and up to November 22d, 1884, the autumn was the warmest for the above period, but the low temperatures after that date materially reduced the mean for the season.

Mattoon, Coles county: mean temperature, 42°, is about 3° above the November average for the last four years.

Sycamore, DeKalb county: mean temperature, 32°.8, is 5°.2 below the November average for the last three years.

Indiana.—Vevay, Switzerland county: mean temperature, 45°.1, is 1°.4 above the November average for the last nine years.

Wabash, Wabash county: mean temperature, 38°.1, is 4°.6 above the November average for the last nine years.

Kansas.—Independence, Montgomery county: mean temperature, 45°.6, is 2° above the November average for the last thirteen years.

Lawrence, Douglas county: mean temperature, 41°.5, is 2°.1 above the November average for the last seventeen years.

Yates Centre, Woodson county: mean temperature, 39°.5, is 2°.3 above the November average for the last four years. The mean temperature for the autumn of 1884, exceeds by 6°2, the autumn average for the last four years.

Emporia, Lyon county: mean temperature, 43°.3, is 3°.4 above the November average for the last five years.

Maine.—Gardiner, Kennebec county: mean temperature, 36°.0, is 0°.4 above the November average for the last forty-eight years.

Maryland.—Fallston, Harford county: mean temperature, 42°.9, is 0°.8 above the November average for the last fourteen years; the highest November mean for that period, 46°.7, occurred in 1870; the lowest, 38°.5. occurred in 1880.

Table of comparative minimum temperatures for the month of November.

State or Territory.	Minimum for November, 1884, Signal Service.		Minimum since Signal-Service stations were opened—3 to 13 years.			Lowest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
		°		°			°		Years.
Alabama	Montgomery	32	Mobile	27	1881	Huntsville	13		9
Do	Mobile	34	Montgomery	24.6	1881	Mount Vernon Arsenal	24		31
Arizona	Prescott	16	Prescott	— 1	1880	Whipple Barracks	— 1		9
Do	Fort Apache	17	Fort Apache	9	1880	Fort Canby (old)	0		12
Arkansas	Little Rock	28	Little Rock	10	1880	Fort Smith	6		21
Do	Fort Smith	22	Fort Smith	22	1882	Washington (near)	15		27
California	Los Angeles	39	Campo	16	1881	Fort Bidwell	9		10
Do	Red Bluff	26	Red Bluff	26	1880	Fort Crook	10		11
Colorado	Pike's Peak	— 4	Pike's Peak	—38	1880	Fort Garland	—35		30
Do	Denver	13	Denver	—18	1877	Pagosa Springs	—38	1880	3
Connecticut	New Haven	18	New Haven	2	1875	New Haven	2		87
Do	New London	23	New London	4	1875	Fort Trumbull	11		47
Dakota	Fort Totten	—22	Pembina	—40	1874	Fort Buford	—37	1875	16
Do	Fort Yates	—21	Bismarck	—28	1875	Fort Pembina	—36	1875	
Delaware	Delaware Breakwater	28	Delaware Breakwater	23	1880	Fort Delaware	20		44
District of Columbia	Washington City	27	Washington City	12.5	1880	Washington City	12		49
Florida	Cedar Keys	42	Saint Marks	27	1877	Fort Barrancas	19		59
Do	Pensacola	40	Pensacola	28.1	1881	Fort King	28		10
Georgia	Atlanta	30	Atlanta	20	1881, 1883	Atlanta	10		7
Do	Augusta	34	Augusta	24	1873	Augusta Arsenal	11		48
Idaho	Cœur d'Alene	20	Eagle Rock	—14	1882	Fort Hall	— 12		4
Do	Boisé City	24	Boisé City	7	1880	Fort Lapwai	0		10
Illinois	Chicago	5	Chicago	— 2	1872	Augusta	—12		10
Do	Springfield	14	Springfield	6	1880	Rock Island Arsenal	— 7		8
Indiana	Indianapolis	12	Indianapolis	— 5	1880	Spiceland	—14	1880	18
Do	Greencastle	10				Logansport	—14	1880	
Indian Territory	Cantonment	18	Fort Gibson	—10	1880	Fort Gibson	0		32
Do			Fort Sill	— 4	1880	Fort Sill	8		4
Iowa	Dubuque	— 1	Dubuque	— 9	1875	Independence	—17	1875	18
Do	Davenport	5	Davenport	— 3	1875	Nora Springs	—16	1875	
Kansas	Dodge City	12	Dodge City	— 7	1880	Fort Leavenworth	—14		51
Do	Leavenworth	10	Leavenworth	3	1875	Fort Scott	—10		10
Kentucky	Louisville	19	Louisville	8	1880	Newport Barracks	4		30
Do						Bowling Green	6	1880	
Louisiana	Shreveport	31	Shreveport	18	1880	Fort Jesup	17		23
Do	New Orleans	42	New Orleans	31.5	1881	New Orleans	29		51
Maine	Eastport	16	Eastport	—13	1875	Orono	—10	1875	13
Do	Portland	23	Portland	— 6	1875	Surry	—13	1875	
Maryland	Baltimore	26	Baltimore	15	1880	Emmitsburg	7	1880	12
Do	Ocean City	24				Cumberland	5	1880	
Massachusetts	Boston	22	Boston	— 2	1875	Williamstown	— 5.5	1875	67
Do	Thatcher's Island	21	Springfield	— 0.5	1875	Florida	—14	1875	4
Michigan	Escanaba	— 5	Escanaba	— 9	1880	Fort Brady	—17	1875	59
Do	Marquette	— 6	Marquette	— 9	1875	Marquette	— 4		9
Minnesota	Duluth	—17	Duluth	—29	1875	Fort Ripley	—30		17
Do	Saint Paul	— 6	Saint Paul	—24.5	1875	Fort Riley	—27	1875	
Mississippi	Vicksburg	32	Vicksburg	23	1877, 1880	Columbus	22		10
Do						Natchez	22		9
Missouri	Saint Louis	13	Saint Louis	8	1880	North Springfield	— 9	1880	
Do						Saint Louis	— 1		38
Montana	Fort Benton	— 8	Fort Benton	—31	1875	Camp Baker	—42		9
Do	Fort Shaw	— 4	Fort Shaw	—26.5	1880	Fort Benton	—36		15
Nebraska	Omaha	2	Omaha	— 6	1875	Camp Sheridan	—17	1880	6
Do	North Platte	4	North Platte	—10	1877	Sydney Barracks	—16	1875	
Nevada			Winnemucca	— 9	1880	Camp Halleck	—12		11
New Hampshire	Mount Washington	— 8.9	Mount Washington	—40	1875	Dartmouth College	— 9		18
New Jersey	Sandy Hook	22	Sandy Hook	6	1880	Somerville	4	1880	
Do	Barnegat City	25	Barnegat City	11	1875	North Germantown	6	1875	2
New Mexico	Fort Stanton	30	Santa Fé	—11	1880	Fort Union	—15	1868	31
Do	Fort Craig	23	Fort Craig	8	1877	Fort Wingate	—13	1880	22
New York	Albany	20	Albany	—10	1875	Gouverneur	—17		40
Do	Oswego	18	Oswego	— 1	1875	Canton	—30	1875	2
North Carolina	Charlotte	29	Charlotte	18	1880	Fort Johnson	9		54
Do	Kitty Hawk	35	Kitty Hawk	22	1879	Ellsworth	10	1880	
Ohio	Columbus	15	Columbus	— 5	1880	College Hill	— 2		68
Do	Cleveland	12	Cleveland	0	1880	Westerville	—13	1880	10
Oregon	Roseburg	30	Roseburg	17.5	1880	Camp Harney	4		12
Do	Portland	34	Portland	22.5	1880	Fort Dalles	4		16
Pennsylvania	Pittsburg	19	Pittsburg	4	1880	Franklin	— 8	1880	8
Do	Erie	16	Erie	6	1880	Philadelphia	12		113
Rhode Island	Narragansett Pier	19	Newport	4	1875	Fort Adams	3	1875	41
Do	Block Island	27	New Shoreham	19	1880				
South Carolina	Charleston	40	Charleston	28	1873, 1881	Aiken	23	1880	8
Do						Charleston	28		105
Tennessee	Knoxville	25	Knoxville	15	1873, 1881	Clarksville	— 3	1880	8
Do	Nashville	27	Nashville	13	1872	Humboldt	9		4
Texas	Fort Elliott	20	Fort Elliott	— 5	1880	Fort Elliott	— 8	1880	3
Do	Fort Davis	27	Fort Davis	6	1880	Fort Richardson	8		6
Utah	Salt Lake City	26	Salt Lake City	3	1880	Coalville	—18	1880	9
Vermont			Burlington	—10	1875	Newport	—18	1875	
Virginia	Lynchburg	27	Lynchburg	13	1880	Fortress Monroe	15	1880	56
Do	Norfolk	36	Norfolk	31	1879	Mount Solon	9	1880	
Washington Territory	Spokane Falls	18	Spokane Falls	3	1881	Fort Colville	— 8		20
Do	Olympia	35	Olympia	21	1882				
West Virginia			Morgantown	8	1880	Helvetia	0	1880	4
Wisconsin	Milwaukee	— 4	Milwaukee	—14	1875	Neillsville	—26	1880	8
Do	La Crosse	— 4	La Crosse	—21	1875	Fort Crawford	—13		25
Wyoming	Cheyenne	2	Cheyenne	—20	1875	Fort Bridger	—40	1880	24

Massachusetts.—Worcester, Worcester county: mean temperature, 39°.1, is slightly below the November average. The highest November average during the last forty-four years, 46°.9, occurred in 1849; the lowest, 30°.4, occurred in 1873.

New Hampshire.—Contoocook, Merrimac county: mean temperature, 36°.8, is about 3° above the normal for the month.

New Jersey.—Moorestown, Burlington county: mean temperature for the autumn of 1884, 55°.2, is 1°.8 above the autumn average for the last twelve years.

New York.—Palermo, Oswego county: mean temperature, 33°.4, is 1°.8 below the November average for the last thirty-one years.

North Volney, Oswego county: mean temperature, 35°.9, is 0°.4 above the November average for the last seventeen years. The mean autumn temperature, 50°.6, is 2°.2 above the autumn average for the same period; the highest autumn mean, 52°.5, occurred in 1881; the lowest, 44°.0, occurred in 1875.

Ohio.—Wauseon, Fulton county: mean temperature, 35°.5, is 0°.2 above the November average for the last fourteen years.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 35°.2, is 0°.9 above the November average for the last seventeen years.

Vermont.—Woodstock, Windsor county: mean temperature, 32°.7, is 1°.7 above the November average for the last seventeen years; the highest November mean for that period, 36°.6, occurred in 1877; the lowest 22°.5, occurred in 1873.

Virginia.—Variety Mills, Nelson county: mean temperature, 42°.4, is 2° below the November average for the last seven years.

Wytheville, Wythe county: mean temperature, 42°.7, is 1°.0 above the November average for the last twenty years.

West Virginia.—Helvetia, Randolph county: mean temperature, 40°.1, is 0°.7 below the November average for the last eight years.

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature were greatest in northern Dakota, and least along the immediate coast of the Pacific and in southern Florida; they exceeded 70° over the northern portion of the country from the upper lake region to western Montana. The smallest ranges are: 13°.6 at Key West, Florida; 18°.5 at Fort Canby, Washington Territory, and 20° at San Francisco, California. The greatest ranges are: 92°.8 at Fort Yates, 84° at Fort Totten, 80°.8 at Fort Bennett, and 80° at Huron, all of these stations being in Dakota. In the table of miscellaneous meteorological data will be found the monthly, and greatest and least daily ranges at the various stations.

The observer at Red Bluff, California, reports the following: "during the afternoon of the 26th, there came, in puffs, winds from the north, as hot as though heated by an extensive fire, causing the temperature to rise from 36° to 79°—a range of 43°."

LOW TEMPERATURES.

Fort Yates, Dakota: very cold weather prevailed on the 23d; at 7 a. m. the temperature was —7°.5, and at sunset it was —21°.3.

Fort Totten, Dakota: the 23d was a very cold day, the temperature falling to —22°.2.

Dubuque, Iowa: the minimum temperature on the morning of the 24th was —1°.2.

Moorhead, Minnesota: the weather on the 23d was very cold; the temperature was below zero all day, the minimum being —15°.

Columbus, Ohio: on the morning of the 24th, the minimum temperature was 15°3, having fallen 40° during the 24 hours preceding.

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st, 2d, 3d, 5th to 30th.

Frost was also reported at Mount Washington on the following dates: 1st to 8th, 11th to 14th, 16th to 30th.

Middle Atlantic states.—3d, 5th to 22d, 24th to 27th, 29th, 30th.

South Atlantic states.—1st, 2d, 3d, 5th to 17th, 20th, 21st, 22d, 24th, 25th, 27th, 29th, 30th.

Florida.—Newport, 16th, 17th, 25th; Archer, 17th, 18th, 25th; Limona, Jacksonville, and Cedar Keys, 25th.

Eastern Gulf states.—5th to 12th, 15th, 16th, 20th, 21st, 24th, 25th, 27th, 29th.

Western Gulf states.—5th to 11th, 14th, 15th, 18th to 30th.

Tennessee.—2d, 5th to 17th, 20th, 21st, 22d, 24th to 30th.

Ohio valley.—1st, 3d, 5th to 16th, 18th to 22d, 24th to 30th.

Lower lake region.—2d, 3d, 6th to 10th, 13th to 17th, 19th to 22d.

Upper lake region.—1st to 30th.

Extreme northwest.—1st to 21st, 23d, 25th, 26th, 28th, 29th.

Upper Mississippi valley.—2d to 21st, 23d to 30th.

Missouri valley.—1st to 30th.

Northern slope.—1st to 30th.

Middle slope.—1st to 30th.

Southern slope.—6th, 9th, 13th, 19th to 24th, 26th, 29th.

Southern plateau.—4th, 5th, 7th, 9th to 30th.

Middle plateau.—1st to 30th.

Northern plateau.—1st, 2d, 3d, 5th to 14th, 16th to 30th.

North Pacific coast region.—1st, 5th, 18th to 30th.

Middle Pacific coast region.—Sacramento, California, 17th to 30th; Red Bluff, California, 17th to 21st, 22d, 26th; Princeton, California, 21st, 30th; Oakland, California, 25th, 27th to 30th; Hydesville, California, 25th, 27th to 30th; Blue Lake, California, 17th to 26th, 28th, 29th, 30th.

South Pacific coast region.—Poway, California, 19th, 22d to 26th.

ICE.

Ice formed in the southern parts of the country as follows:

Arizona.—Wickenburg, 19th, 20th.

Arkansas.—Fort Smith, 20th; Mount Ida, 4th, 5th, 7th to 10th, 20th, 24th, 25th, 26th; Lead Hill, 6th, 7th, 20th, 21st, 23d to 27th.

California.—Princeton, 21st.

Delaware.—Delaware Breakwater, 6th, 25th.

Georgia.—Athens, 6th to 10th, 25th.

Louisiana.—Shreveport, 24th; Liberty Hill, 20th.

Maryland.—Baltimore, 7th.

New Jersey.—Atlantic City and Sandy Hook, 7th.

North Carolina.—Charlotte, 6th, 7th; New River Inlet, 7th, 25th; Weldon, 7th; Flat Rock, 6th to 11th, 16th.

Ohio.—Cincinnati, 24th.

Tennessee.—Chattanooga, 6th, 7th, 8th, 25th.

Texas.—Fort Elliott, 18th—first ice of season; Clarksville, 23d.

Virginia.—Dale Enterprise, 7th.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada, for the month of November, 1884, as determined by the reports from more than seven hundred stations, is exhibited on chart iii.

The precipitation for November, 1884, has been less than the average over nearly the entire country. The largest deficiencies have occurred on the Pacific coast and over the region extending from the Gulf of Mexico northward to British America. In Tennessee the precipitation was but little more than one-third of the average; in the Ohio valley and east Gulf states it was less than one-half; in the upper Mississippi valley, a little more than one-half; in the lake region, about two-thirds, and in the west Gulf states about three-fourths. While the deficiencies in these districts generally, have been marked, there are a few localities where the precipitation has been excessive, viz: at Brownsville, Texas, the excess over the average was 1.04; at Shreveport, Louisiana, 0.86; at Pensacola, Florida, 0.78; and at Marquette, Michigan, 0.47. On the north Pacific coast where the average precipitation for November, for a series of years has been 6.11; this year it was 1.80, or less than one-third of the average; in the middle Pacific coast region the average for November in previous years has been 2.18, and for the present year it was but 0.10. Out of the reports from one hundred and nineteen stations in California, along the lines of the Central Pacific and Southern Pacific railroads, seventy-four report the entire absence of rain during the month, and the remaining stations report rainfalls averaging about 0.30. On the Atlantic coast the monthly precipitation was excessive over portions of Maine, Delaware, Maryland, Virginia, North Carolina, and Florida; on the sum-

mit of Mount Washington, it exceeded the average for the last thirteen years by 1.47; excesses of 0.10 and 0.65 occurred at New York City, and Atlantic City, New Jersey, respectively. On the North Carolina coast in the vicinities of Kitty Hawk and Hatteras, the monthly precipitation was unusually heavy; at these stations the amounts were 7.14 and 13.02, or excesses over the respective averages of 2.09 and 7.42.

In the following table are shown for each of the several geographical districts, as deduced from Signal Service observations, the average November precipitation for a series of years; the average for November, 1884; and the departures from the normal:

Average precipitation for November, 1884.

Districts.	Average for Nov. Signal-Service observations.		Comparison of Nov., 1884, with the average for several years.
	For several years.	For 1884.	
	Inches.	*Inches*	*Inches.*
New England	4.45	3.55	−0.90
Middle Atlantic states	3.38	2.70	−0.68
South Atlantic states	3.79	4.08	+0.29
Florida peninsula	2.89	4.84	+1.95
Eastern Gulf states	4.88	3.16	−1.72
Western Gulf states	4.68	3.67	−1.01
Rio Grande valley	1.71	1.74	+0.03
Tennessee	4.60	1.68	−2.92
Ohio valley	3.57	1.52	−2.05
Lower lake region	3.19	2.17	−1.02
Upper lake region	3.35	2.27	−1.08
Extreme northwest	0.82	0.54	−0.28
Upper Mississippi valley	2.65	1.56	−1.09
Missouri valley	1.01	0.42	−0.59
Northern slope	0.65	0.51	−0.14
Middle slope	0.47	0.70	+0.23
Southern slope	0.83	1.20	+0.37
Southern plateau	0.51	0.32	−0.19
Northern plateau	2.43	0.44	−1.99
North Pacific coast region	6.11	1.80	−4.31
Middle Pacific coast region	2.18	0.10	−2.08
South Pacific coast region	0.56	0.39	−0.17
Mount Washington, N. H.	6.52	7.99	+1.47
Pike's Peak, Colo.	2.10	0.12	−1.98
Salt Lake City, Utah	1.57	0.50	−1.07

The departures for the months of August, September, and October, as published in the REVIEW for the last-named month, together with those for November and the totals for the four months are given below. These figures show marked deficiencies on the Pacific coast and in all districts east of the Mississippi river, with the exception of the upper lake region, where the precipitation has been about normal. The largest deficiencies are those for Tennessee, the middle Atlantic, south Atlantic and east Gulf states, and the north Pacific coast region. The excess in the Rio Grande valley, as shown in the table published in the October REVIEW, remains unchanged, a normal quantity of rain having fallen during November. The excesses in the western districts have been generally small, the greatest being those of the extreme northwest, upper Mississippi valley and southern slope, where they ranged from 2.00 3.00.

Precipitation departures from normal, August–November, 1884.

Districts.	August.	September.	October.	November.	Total.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
New England	+1.51	−2.51	−1.38	−0.90	−3.15
Middle Atlantic states	−0.94	−3.72	−1.48	−0.68	−6.82
South Atlantic states	−0.70	−1.63	−3.17	+0.29	−5.21
Florida peninsula	−1.98	−0.97	−2.81	+1.95	−3.81
East Gulf states	−4.01	−1.97	−0.81	−1.72	−8.51
West Gulf states	−1.78	+0.87	−0.64	−1.01	−2.56
Rio Grande valley	−5.19	+4.37	+7.37	+0.03	+6.58
Tennessee	−1.04	−1.05	−1.12	−2.92	−6.13
Ohio valley	−1.21	+1.21	−1.44	−2.05	−3.49
Lower lake region	−0.59	−0.51	−1.10	−1.02	3.22
Upper lake region	+0.24	−0.03	+1.17	−1.08	+0.30
Extreme northwest	+2.20	+0.64	+0.21	−0.28	+2.77
Upper Mississippi valley	+0.60	+3.33	+0.21	−1.09	+3.05
Missouri valley	+0.51	−0.06	+0.54	−0.59	+0.40
Northern slope	+0.36	+0.27	−0.55	−0.14	−0.06
Middle slope	+1.07	−1.17	+0.30	+0.23	+0.49
Southern slope	−0.72	+0.37	+2.93	+0.37	+2.95
Southern plateau	−0.21	+0.21	+1.30	−0.19	+1.11
Northern plateau	−0.13	+0.92	+0.01	−1.99	−1.18
North Pacific coast region	−0.18	+1.05	−1.48	−4.31	−4.91
Middle Pacific coast region	−0.01	+0.12	+0.64	−2.08	−1.33
South Pacific coast region	−0.05	−0.03	−0.31	−0.17	−0.46

The monthly precipitation with the departures from the normal at the several Signal Service stations will be found in the table of miscellaneous meteorological data.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation for November, 1884, and in the table of miscellaneous meteorological data for the Signal Service stations. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 4.71, is 0.31 above the November average for the three preceding years.

California.—Hydesville, Humboldt county: monthly precipitation, 0.69, is 0.99 less than that for November 1883, and is considerably below the average.

Connecticut.—Hartford: monthly precipitation, 2.78, is 2.09 below the November average.

Illinois.—Anna, Union county: monthly precipitation, 2.58, is 1.22 below the November average for the last nine years.

Riley, McHenry county: monthly precipitation, 2.79, is 0.24 below the November average for the last twenty-four years. The total precipitation for the autumn of 1884, is 9.98, or 1.43 more than the autumn average for the last twenty-three years.

Sycamore, DeKalb county: monthly precipitation, 2.48, is 1.68 below the November average for the three preceding years.

Indiana.—Vevay, Switzerland, county: monthly precipitation, 1.13, is 2.03 below the November average for the last nineteen years.

Logansport, Cass county: monthly precipitation, 1.82, is 1.01 below the November average for the last twenty-five years. The monthly snowfall, 4.3, is 0.9 below the average for November.

Wabash, Wabash county: monthly precipitation, 1.64, is 1.55 below the November average for the last nine years.

Kansas.—Independence, Montgomery county: monthly precipitation, 2.58, is 0.29 in excess of the November average for the last twelve years.

Lawrence, Douglas county: monthly precipitation, 0.80, is 1.18 below the November average for the last seventeen years.

Yates Centre, Woodson county: monthly precipitation, 1.62, is 0.42 below the November average for the four preceding years.

Emporia, Lyon county: monthly precipitation, 1.93, is 0.49 in excess of the November average.

Maine.—Gardiner, Kennebec county: monthly precipitation, 3.29, is 1.03 below the November average for the last forty-eight years.

Maryland.—Fallston, Harford county: monthly precipitation, 3.14, is 0.42 below the November average for the last fourteen years. The largest November precipitation for that period, 10.46, occurred in 1877; the smallest, 0.42, occurred in 1882.

Massachusetts.—Worcester, Worcester county: monthly precipitation, 2.27, is 1.44 below the November average for the last forty-three years; the smallest November precipitation for that period, 1.69, occurred in 1858; the largest, 9.82, occurred in 1854.

New Hampshire.—Contoocook, Merrimac county: monthly precipitation, 3.70, is about the average for November.

Antrim, Hillsborough county: monthly precipitation, 3.35, is 0.90 below the November average for the last nine years.

New York.—North Volney, Oswego county: monthly precipitation, 2.40, is 1.21 below the November average for the last thirteen years. The total precipitation (on fifty-five days) for the autumn of 1884 is 7.60, being 2.38 below the autumn average for the last thirteen years. The largest autumn precipitation for that period, 13.05, occurred in 1878; the smallest, 5.40, occurred in 1882.

Palermo, Oswego county: monthly precipitation, 2.18, is 1.59

below the November average for the last thirty-one years. The largest November precipitation of that period, 8.30, occurred in 1863; the smallest, 1.01, occurred in 1882.

Ohio.—Wauseon, Fulton county: monthly precipitation, 1.46, is 1.78 below the November average for the last twelve years, and is the smallest November precipitation for that period; the largest, 5.83, occurred in 1881.

Pennsylvania.—Dyberry, Wayne county: monthly precipitation, 2.48, is 0.29 below the November average for the last thirteen years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 4.35, is 1.32 in excess of the November average for the last sixteen years. The largest November precipitation for that period, 4.95, occurred in 1877; the least, 0.71, occurred in 1882.

Virginia.—Variety Mills, Nelson county: monthly precipitation, 2.42, is 0.18 above the November average for the last six years.

Wytheville, Wythe county: monthly precipitation, 1.41, is 1.40 below the November average for a period of twenty years, and is the smallest November precipitation for that period, with the exception of 0.50 and 1.10 in 1862 and 1879, respectively. The precipitation for the first eleven months of 1884 is but 1.21 below the annual average, although an unprecedented drought prevailed through the greater part of the last four months, the small deficiency being due to the abnormally heavy rains of the earlier months.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 2.66, is 1.93 below the November average for the last eight years.

SNOW.

The dates on which snow fell in the various districts are as follows:

New England.—1st, 19th, 20th, 25th, 26th, 28th.

Middle Atlantic states.—3d, 5th, 6th, 18th, 19th, 20th, 24th to 27th, 30th.

Ohio valley.—5th, 6th, 17th, 18th, 19th, 23d to 30th.

Lower lake region.—4th, 5th, 6th, 18th, 19th, 20th, 23d to 30th.

Upper lake region.—1st to 6th, 11th, 12th, 15th to 30th.

Extreme northwest.—1st, 3d, 4th, 11th, 12th, 16th, 18th to 22d, 24th to 30th.

Upper Mississippi valley.—4th, 5th, 9th, 17th to 30th.

Missouri valley.—1st, 3d, 16th to 27th, 29th, 30th.

Northern slope.—1st, 3d, 15th, 16th, 17th, 19th to 22d, 24th, 26th to 29th.

Middle slope.—17th, 18th, 22d, 30th; snow fell on the summit of Pike's Peak, Colorado, on dates as follows: 14th, 17th, 18th, 21st, 22d, 27th, 28th.

Southern plateau.—Fort Craig, New Mexico, on the 21st, in surrounding mountains. Fort Wingate, New Mexico, 20th.

Middle plateau.—1st, 16th, 17th.

Northern plateau.—15th, 21st 22d.

LARGEST MONTHLY SNOW-FALLS.

[*Expressed in inches and tenths.*]

Monthly snow-falls of 2 inches or more were reported from the various states and territories during the month as follows:

Connecticut.—Southington, 2.0.

Dakota.—Deadwood, 8.9; Richardton, 8.0; Bismarck, 6.4; Fort Buford, 2.9; Fort Totten, 2.5; Webster, 2.4.

Illinois.—Bunker Hill, 3.1; Mattoon, 3.0; Springfield, 2.6.

Indiana.—Farmland, 6.5; Logansport, 4.4; Spiceland and Sunman, 3.8; Wabash, 3.6; Noblesville, 3.0; Lafayette and Terre Haute, 2.5; Greencastle and Indianapolis, 2.1; Attica and Hancock, 2.0.

Iowa.—Indianola, 4.0; Des Moines, 3.9; West Union, 2.6.

Kansas.—Clay Centre, 5.0; Maud, 4.0; Emporia, 3.0; Atchison, 2.7; Leavenworth, 2.1; Salina, Sherlock, and Holton, 2.0.

Maine.—Gardiner, 8.0; Portland, 5.5; Eastport, 4.1.

Maryland.—Cumberland, 2.0.

Massachusetts.—Rowe, 15.0; Williamstown, 9.0; Boston, 4.8; Princeton and Mendon, 3.0; Worcester, Westborough and Milton, 2.5.

Michigan.—Marquette, 24.0; Boyne, 14.8; Traverse City, 12.5; Mackinaw City, 8.0; Alpena and Northport, 7.5; Grand Haven, 8.8; Hillsdale, 5.3; Ann Arbor, 4.7; Ionia, 4.6; Escanaba, 4.2; Manistique, 3.8; Swartz Creek, 2.3; Lansing, 2.2.

Minnesota.—Duluth, 9.5; Saint Paul, 7.2; Minneapolis, 6.6; Northfield, 6.0; Saint Vincent, 4.7; Moorhead and Chester, 4.0.

Montana.—Fort Custer, 19.2(?); Fort Shaw, 7.4; Helena, 4.6; Fort Assinaboine, 4.2; Fort Benton, 3.6; Fort Maginnis, 2.8.

Nebraska.—Tecumseh, 6.0.

New Hampshire.—Mount Washington, 22.8; Antrim, 10.0.

New York.—Humphrey, 14.5; Oswego, 7.6; North Volney, 7.0; Ithaca, 6.8; Cooperstown, 6.5; Albany, 6.2; Menand Station (near Albany), 6.0; Palermo, 6.5; Penn Yan, 4.5; Port Jervis, 3.0; Le Roy, 2.5.

Ohio.—Hiram, 10.0; Sandusky, 7.7; New Athens, 5.5; Cleveland, 4.7; Columbus, 4.2; Cincinnati, 3.2; College Hill and North Lewisburg, 3.9; Wauseon, 2.5; Ruggles, 2.0.

Pennsylvania.—Erie, 32.0; Grampian Hills, 9.0; Wellsborough, 6.6; Troy, 6.2; Pittsburg, 4.0; Leetsdale, 3.8; Drifton, 2.8; Catawissa, 2.6; Dyberry and Chambersburg, 2.5.

Rhode Island.—Providence, 2.0.

Vermont.—Woodstock, 10.2; Dorset, 10.0; Strafford, 8.0; Lunenburg, 6.0; Newport, 5.8; Burlington, 2.0.

West Virginia.—Helvetia, 6.0.

Wisconsin.—Wausau, 10.0; Neillsville, 7.0; Sussex, 6.5; Embarras, 6.0; La Crosse, 5.7; Madison, 4.4; Beloit, 3.8; Prairie du Chien, 2.5; Franklin, 2.0.

Wyoming.—Cheyenne, 2.0.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[*Expressed in inches and tenths.*]

Colorado.—Pike's Peak, trace.

Dakota.—Deadwood, 33.

District of Columbia.—West Washington, 0.5.

Illinois.—Mattoon, 2.0; Springfield, 1.1; Riley, 0.5.

Indiana.—Spiceland, 3.0; Lafayette, Logansport, and Terre Haute, 2.0; Indianapolis and Wabash, 1.5; Greencastle, 1.1; Fort Wayne, 0.5.

Iowa.—West Union, 2.0; Independence, Keokuk, and Monticello, 1.0; Guttenberg and Somerset, 0.8; Des Moines, 0.5; Clay Center, Dubuque, and Indianola, trace.

Maryland.—Baltimore, trace.

Michigan.—Marquette, 12.0; Traverse City and Northport, 6; Boyne, 4.5; Grand Haven, 3.5; Ann Arbor and Port Huron, 2.0; Detroit, 1.5; Ionia, 1.0; Escanaba, 0.1.

Minnesota.—Minneapolis, 5.0; Saint Paul, 4.5; Chester, 4.0; Saint Vincent and Northfield, 3.0.

Montana.—Fort Maginnis, trace.

New Hampshire.—Mount Washington, 10.0.

New Jersey.—Readington and South Orange, 0.5.

New York.—Humphrey, 3.0; Oswego, 1.0; Palermo, 0.2; Ithaca, North Volney and Rochester, trace.

Ohio.—Cleveland, 3.2; North Lewisburg, Ruggles, and Hiram, 2.0; New Athens, 1.0; Wauseon, and Westerville, 0.5.

Pennsylvania.—Erie, 4.0; Leetsdale, 1.0; Troy, 0.8; Grampian Hills, 0.5; Wellsborough, trace.

Vermont.—Burlington, 2.0; Newport, 0.2; Dorset, trace.

Virginia.—Variety Mills, 1.0; Wytheville, 0.5; Lynchburg, 0.3; Blacksburg, 0.2.

West Virginia.—Helvetia, 1.5.

Wisconsin.—La Crosse and Sussex, 4.0; Madison, 3.0; Wausau and Prairie du Chien, 2.0; Milwaukee, 1.0; Beloit and Neillsville, 1.5; Embarras, trace.

SLEET.

Arizona.—Prescott, 2d.

Connecticut.—New London, 19th.

Dakota.—Yankton, 21st; Huron, 26th to 29th.
District of Columbia.—Washington City, 18th.
Illinois.—Cairo, 28th; Springfield, 23d; Anna, 27th.
Indiana.—Greencastle, 25th.
Indian Territory.—Cantonment, 22d.
Iowa.—Dubuque, 26th.
Kansas.—Leavenworth, Holton, Independence, and Clay Centre, 22d; Allison, 29th.
Maine.—Eastport, 20th, 21st.
Maryland.—Baltimore and Fallston, 18th.
Massachusetts.—Thatcher's Island and Boston, 19th.
Michigan.—Grand Haven, 1st, 5th; Kalamazoo, 4th.
Montana.—Fort Maginnis, 26th.
Nebraska.—North Platte, 21st, 27th; Yutan, 22d.
New Hampshire.—Mount Washington, 1st, 2d, 11th.
New Jersey.—Sandy Hook, 18th.
New York.—Oswego, 5th, 29th, 30th; Buffalo, 23d; Fort Hamilton and Fort Columbus, 18th, 19th.
Ohio.—Cleveland, 5th.
Pennsylvania.—Philadelphia, 18th, 19th; Fallsington, 18th; Leetsdale, 24th.
Rhode Island.—Point Judith, 8th to 11th, 16th, 18th, 19th, 20th; Narragansett Pier, 19th.
Utah.—Salt Lake City, 17th, 18th.
Virginia.—Fort Myer, 18th.
Wisconsin.—La Crosse, 1st; Beloit, 5th; Milwaukee, 23d.

HAIL.

Fort Smith, Arkansas, 3d: heavy rain fell at 4.15 p. m., followed at 4.25 by hail, lasting eight minutes; the hail stones measured from one-fourth to one-half inch in diameter.

Fort Apache, Arizona, on the 8th, small hail stones fell for three minutes, beginning at 4.15 p. m.

Hail is also reported to have fallen at the following places:
Fort Bidwell, California, 16th.
North Colebrook, Connecticut, 4th, 19th, 20th.
Fort Wayne, Indiana, 30th.
Guttenberg, Iowa, 1st, 26th.
Bowling Green, Kentucky, 18th.
Moorestown, New Jersey, 18th.
Factoryville, New York, 5th.
Menand Station (near Albany), New York, 5th.
Wauseon, Ohio, 18th, 20th, 21st, 22d.
Dale Enterprise, Virginia, 18th, 19th.
Embarras, Wisconsin, 21st, 23d.

Table of excessive and greatest monthly precipitation—November, 1884.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Alabama.				*North Carolina.*			
Clintonville	27, 28	3.10		Hatteras	15, 16	5.15	13.02
Summerville	28	2.75		Do	28, 29	3.22	
Bolling	27	2.13		Kitty Hawk	15, 16	4.07	7.14
Fayette	28	2.00		Highland	22, 23	3.00	
Arkansas.				Charlotte	28, 29	2.75	
Lead Hill	22	3.32		Brevard	22, 23	2.65	
Florida.				*Pennsylvania.*			
Key West	4	3.51	6.03	Wellsborough	23, 24	5.50	6.61
Do	27, 28	3.39		Drifton	23, 24	2.14	
Jacksonville	27, 28	3.93		Blooming Grove	23	2.10	
Mayport	27, 28	2.37		*Rhode Island.*			
Pensacola	22, 23	3.21		Nayatt Point	1, 2	2.00	7.68
Kansas.				*Texas.*			
Independence	22	2.06		Cleburne	22	2.75	
Louisiana.				Galveston	22	2.51	
Point Pleasant	27, 28, 29	6.49	7.99	New Ulm	11	2.00	
Shreveport	22	3.13		Do	22	2.75	
New Orleans	11	3.03		*Washington Ter.*			
Massachusetts.				Neah Bay	1	2.05	9.10
Princeton	24, 25	2.82		Do	3, 4	2.10	
Worcester	19, 20	2.50		Tatoosh Island			6.80
Michigan.				*West Virginia.*			
Northport	24, 25	3.25?	7.00?	Helvetia	28, 29	2.00	
Do	28, 29	2.25?		*Wisconsin.*			
New Hampshire.				Franklin	22	2.09	
Mt. Washington	4, 5	2.16	7.99				
Do	23, 24	3.37					

WINDS.

The most frequent directions of the wind during November, 1884, are shown on chart ii., by arrows flying with the wind. Over the northern portions of the country the prevailing winds were westerly; on the Atlantic coast south of Virginia, they were northeasterly; in the southern states they were northerly, and in the other districts variable.

HIGH WINDS.

(In miles per hour.)

Wind velocities of fifty or more miles per hour were recorded during the month as follows:

Mount Washington, New Hampshire, 68, nw., 2d; 80, se., 5th; 96, nw., 6th; 80, nw., 7th and 8th; 60, nw., 9th and 10th; 68, nw., 12th; 60, nw., 13th; 107, nw., 14th; 100, nw., 15th; 60, nw., 18th; 64, w. and nw., 21st; 68, nw., 28th; 128, s., 23d; 96, s., 24th; 88, sw., 25th; 60, sw., 26th; 52, w., 27th; 60, sw., 28th.

Pike's Peak, Colorado, 60, w., 2d; 60, nw., 19th; 52, nw., 20th; 82, nw., 23d.

Cape Mendocino, California, 68, se., 6th; 54, s., 8th; 62, s., 9th; 64, s. 10th; 58, s., 14th.

Fort Macon, North Carolina, 55, sw., 29th.

Sandy Hook, New Jersey, 52, sw. and nw. 5th; 64, nw., 24th.

Barnegat City, New Jersey, 52, s., 23d.

Cape May, New Jersey, 56, w., 24th.

Delaware Breakwater, Delaware, 24, se., 23d.

Buffalo, New York, 60, w., 23d.

Fort Maginnis, Montana, 56, nw., 26th.

Cheyenne, Wyoming, 56, nw., 26th.

Fort Canby, Washington Territory, 53, se., 23d.

The total movements of the air, with the highest velocities recorded during November at the various Signal Service stations are shown in the table of miscellaneous meteorological data.

LOCAL STORMS AND TORNADOES.

New Orleans, Louisiana, 24th: a tornado occurred near Edgard, Saint John Baptist parish, about 5.30 p. m. on the 22d. The length of path was between three and four miles, and its width was but a few rods. The tornado was but a moment in passing a given point. The losses to life and property are as follows: two persons killed, and ten seriously injured; a number of mules and cattle killed; fifteen buildings destroyed; the total loss of property is estimated at $50,000. At New Orleans a storm prevailed during the afternoon from 12.55 to 5.35 p. m.; a wind-velocity of 28 miles per hour occurred at 1.10 p. m.; no damage resulted from the storm.

A violent wind and rain storm occurred at Vacherie, Saint James' parish, Louisiana, between 4 and 5 p. m. on the 22d; the wind blew from the southeast. A heavy wind and rain storm also occurred at Thibodeaux, La Fourche parish, causing great damage to life and property. One person was killed by lightning at La Fourche Crossing.

Wilkesbarre, Pennsylvania, 23d: a heavy wind and rain storm occurred on this date. The wind during the early morning blew from the south and southwest in strong gusts. Shortly after noon rain began to fall, at first lightly, but at 6 p. m. very heavily, still accompanied by high wind, which subsided about 7 p. m., but the heavy rain continued until 11 p. m. Much damage was done in the city by the wind and rain.

Scranton, Pennsylvania: a heavy rain and wind storm occurred on the 23d, the storm being most violent about 6 p. m., and ending at 9 p. m. Trees and fences were blown down, also the upper part of a church spire.

Cumming, Forsyth county, Georgia: at 5 p. m. on the 29th, a heavy gale blew from the west; at 8 p. m. the wind changed to northwest and blew at the rate of forty-miles per hour.

Pensacola, Florida: a severe squall occurred at 1.35 a. m. on the 23d, lasting fifteen minutes, the wind attaining a velocity of thirty-two miles per hour; many trees were uprooted or broken down and fences leveled.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest depths for November, 1884, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, November, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:	Ft. In.		Ft. In.		Ft. In.	Ft. In.
Shreveport, Louisiana	39 9	9 to 13	4 8	1	0 10	3 10
Arkansas:						
Little Rock, Arkansas	23 0	30	9 0	20	3 3	5 9
Fort Smith, Arkansas	15 0	28	2 0	16	‡—4 9	6 9
Missouri:						
Yankton, Dakota	24 0	1	8 2	22 to 30	6 1	2 1
Omaha, Nebraska	18 0	1 to 7	6 11	27	4 7	2 4
Leavenworth, Kansas	20 0	1 to 4	7 7	30	5 0	2 7
Mississippi:						
Saint Paul, Minnesota*	14 6	1, 2, 3	5 3	23	2 4	2 11
La Crosse, Wisconsin‡	24 0	2, 3, 4	8 5	25	2 9	2 8
Dubuque, Iowa	16 0	1, 2, 8	8 9	30	3 5	5 4
Davenport, Iowa	15 0	1	7 2	30	3 2	4 0
Keokuk, Iowa	14 0	1	8 5	30	4 1	4 4
Saint Louis, Missouri	32 0	1	16 11	22	10 8	6 3
Cairo, Illinois	40 0	1	15 11	25	9 5	6 6
Memphis, Tennessee	34 0	1	10 7	26, 27	5 3	5 4
Vicksburg, Mississippi	41 0	4	14 1	30	5 8	8 5
New Orleans, Louisiana†	—3 0	1	—11 10	21	—13 3	1 4
Ohio:						
Pittsburg, Pennsylvania	22 0	1	3 1	20 to 25	1 0	2 0
Cincinnati, Ohio	50 0	9	0 1	1 to 5	3 0	3 1
Louisville, Kentucky	25 0	11, 12	3 11	8 9	2 9	1 2
Cumberland:						
Nashville, Tennessee	40 0	8, 9	1 5	21 22	0 5	1 0
Tennessee:						
Chattanooga, Tennessee	33 0	27 29	1 10	17	0 7	1 3
Monongahela:						
Pittsburg, Pennsylvania	29 0	1	3 0	20 to 25	1 0	2 0
Savannah:						
Augusta, Georgia	32 0	25	7 0	9	4 8	2 4
Willamette:						
Portland, Oregon	.....	6, 7	5 4	29	1 6	3 10
Sacramento:						
Red Bluff, California	.....	1 to 30	0 11	1 to 30	0 11	0 0
Sacramento, California	.....	21, 22, 23	8 0	24 to 30	7 10	0 2
Mobile:						
Mobile, Alabama	.....	1, 2	16 6	7	14 4	2 2
Colorado:						
Yuma, Arizona	.....	4	15 10	30	14 1	1 9

‡ Below bench mark. † Below high-water mark of 1874 and 1883.
* River frozen from 24th to 30th. ‡ River frozen from 27th to 30th.

At Chattanooga the lowest stage of water in the Tennessee river was attained on the 17th, when the depth was seven inches above low-water mark, or several inches lower than has been known at this season for several years; the highest stage of water was observed on the 27th and 29th, when the depth was one foot and ten inches above low-water mark.

The Cumberland river at Nashville was not navigable at any time during the month.

ICE IN RIVERS AND HARBORS.

Penobscot river.—Bangor, Maine: ice formed along the shores of the river on the 16th; during the night of the 18–19th the river froze over, but the ice was broken up by the tides during the day.

Hudson river.—Albany, New York: floating ice on the 21st.

Lake Erie.—Sandusky, Ohio: navigation for the season was practically closed on the 29th. The steamer "Jay Cooke" made her last trip to the islands on this date.

Maumee bay and river.—Toledo, Ohio: floating ice in river on the 27th, and in the bay on the 29th.

Rock river.—Rockford, Winnebago county, Illinois: river partially frozen on 24th; and on the 30th it was entirely closed.

Ontonagon river.—Ontonagon, Michigan: on the 24th teams crossed the river on the ice.

Lake Superior.—Duluth, Minnesota: during the night of the 22–23d Dulnth and Superior bays froze over. The temperature fell to —17° on the 24th, when the ice was from six to seven inches thick. The barge "George Spencer" left for the lower lakes on the 25th, being the last departure of the season.

Milwaukee river.—Milwaukee, Wisconsin: the river froze over on the 25th.

Red river of the north.—Saint Vincent, Minnesota: the river froze over during the night of the 16–17th, but the ice broke up on the afternoon of the day following; the river froze over again on the 22d, closing navigation for the season.

Devil's Lake.—Fort Totten, Dakota: Fort Totten bay was covered with thin ice on the 2d; the lake froze over on the 17th, closing navigation for the season; on the 19th, the high northwesterly winds broke up the ice in the body of the lake, and heaped it along the shores, in some places, to depths of several feet.

Mississippi river.—Saint Paul, Minnesota: the last steamer of the season to leave this port, departed for Saint Louis on the 12th; floating ice in river, and the first permanent ice formed along the shores, on the 20th; floating ice continued on the 21st, 22d, and 23d; at 11 a. m. on the 24th, an ice dam formed, and by noon, the river was covered with ice as far as could be observed.

La Crosse, Wisconsin: floating ice from 23d to 26th; river froze over on the 27th; persons crossed the river on the ice on 28th; the last boat of the season left on the 23d.

Dubuque, Iowa: floating ice in river from 24th to 30th; all boats were laid up for the winter and navigation closed for the season on the 21st.

Davenport, Iowa: floating ice in river from 25th to 30th; the steamer "Wes Rambo" passed northward on the 22d, being the last boat of the season.

Muscatine, Muscatine county, Iowa: the first floating ice in river was observed on 25th.

Keokuk, Iowa: light floating ice in river on 28th and 30th; navigation was closed for the season on the latter date.

Missouri river.—Fort Yates, Dakota: floating ice in river on the 4th, 5th, 6th, 18th, 19th, 21st, 22d; the river froze over during the night of the 22–23d.

Fort Sully, Dakota: floating ice on the 5th and 6th; the river froze over during the night of the 17–18th; the high winds on the 19th broke up the ice; river froze again on the 20th; ice moved out of river on the 24th.

Fort Bennett, Dakota: floating ice on the 21st.

Maquoketa river.—Monticello, Jones county, Iowa: river froze over on the 24th.

MISCELLANEOUS.

Fort Bridger, Wyoming: considerable "anchor ice" was observed in Black's Fork of Green river on the morning of the 9th.

Edgington, Rock Island county, Illinois: at the close of the month the ground was frozen to a depth of six inches.

HIGH TIDES.

Eastport, Maine, 4th, 5th, 6th, 8th, 9th.
Narragansett Pier, Rhode Island, 19th.
New River Inlet, North Carolina, 5th, 9th, 10th.

LOW TIDES.

Eastport, Maine, 26th.
New River Inlet, North Carolina, 24th to 29th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 85.74 per cent. The percentages for the four elements are: Weather, 90.06; direction of the wind, 82.32; temperature, 82.82; barometer, 88.58 per cent. By geographical districts, they are: For New England, 86.90; middle Atlantic states, 86.53; south Atlantic states, 86.30; eastern Gulf states, 84.87; western Gulf states, 87.00; lower lake region, 85.53; upper lake region, 86.15; Ohio valley and Tennessee, 88.30; upper Mississippi valley, 84.97; Missouri valley, 79.66; north Pacific coast region, 81.25; middle Pacific coast region, 90.83; south Pacific coast region, 91.67. There were eleven omissions to predict out of 3,252, or 0.34 per cent. Of the 3,241 predictions that have been made, seventy-six, or 2.34

per cent., are considered to have entirely failed; one hundred and eight, or 3.33 per cent., were one-fourth verified; three hundred and seventy-one, or 11.45 per cent., were one-half verified; four hundred and eighty-three, or 14.90 per cent., were three-fourths verified; 2,203, or 67.97 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During November, 1884, two hundred cautionary signals were ordered. Of these, one hundred and eighty-two, or 91.00 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Ninety-one cautionary off-shore signals were ordered, of which number seventy-eight, or 85.71 per cent., were fully justified, both as to direction and velocity; eight-nine, or 97.80 per cent., were justified as to direction; and eighty, or 87.91 per cent., were justified as to velocity. Two hundred and ninety-one signals of all kinds were ordered, two hundred and sixty, or 89.35 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the ninety-one cautionary off-shore signals ordered, fifty-three were changed from cautionary. Two signals were ordered late. In sixty-nine cases winds of twenty-five miles or more per hour were reported, for which no signals were ordered.

COLD-WAVE SIGNALS.

The following circular, issued by the Chief Signal Officer, and sent to observers, postmasters, and others co-operating with the Signal Service, explains the system now in use of announcing the approach of cold waves:

SIGNAL OFFICE, WAR DEPARTMENT,

Washington City, ..., 188...

CIRCULAR.

Published by co-operation of the War and Post Office Departments.

.....

.....

.....

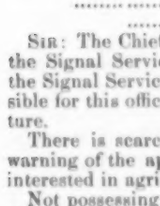
SIR: The Chief Signal Officer is desirous of increasing the usefulness of the Signal Service reports in your section. The information collected by the Signal Service, by means of the daily telegraphic reports, renders it possible for this office to announce the approach of sudden changes in temperature.

There is scarcely an industry which would not be greatly benefited by warning of the approach of *cold waves*, and especially is this true of those interested in agriculture and stock-farming.

Not possessing the necessary funds to convey this information by telegraph to the various sections of the country, the next best means has been adopted, viz., to publish the information in the Farmers' Bulletin, as follows:

"COLD WAVE COMING."

Cold-wave flag has been ordered up at....., and the temperature will probably fall.....in the next.....hours.



The country has been divided into districts, and *cold-wave* stations established at central points; when cold weather is anticipated, the *cold-wave* flag (white flag, six or eight feet square, with black centre, about two feet square) will be ordered up at the central station and the information published in the Farmers' Bulletin. These bulletins are displayed at post-offices, and it is believed that a much wider distribution of the information thus given may be secured by the display of *cold-wave* flags at the various post-offices where the bulletin may be received.

The Signal Service is not prepared to furnish these flags for general use, but arrangements have been made with two firms, who offer to furnish these flags for a small sum, viz.:

M. G. COPELAND & CO.,
643 LOUISIANA AVENUE, WASHINGTON, D. C.

6 x 6 feet white flag, with 2 x 2 feet black square in centre, made from cotton $0.65

6 x 6 feet white flag, with 2 x 2 feet black square in centre, made from best bunting, with rope in heading and toggle..... $2.50

HORSTMAN BROS. & CO.,
FIFTH AND CHERRY STREETS, PHILADELPHIA, PA.

6 x 6 feet white flag, with 2 x 2 feet black square in centre, made from a good quality of bunting, with rope in heading and toggle..... $2.40 and $3.50

6 x 6 feet white flag, with 4 x 4 feet black square in centre, made from the best standard bunting, with rope in heading and toggle..... $4.00 and $5.00

Please correspond directly with either of the above firms.

There may be parties residing in the vicinity of your office willing to co-operate in this work by furnishing the flag and displaying it at some prominent point for the benefit of the public. It is believed that much benefit will result from prompt action on the part of those who may be charged with the display of these flags, and probably some arrangement may be made with the railroad companies, along whose line stations may be located, to transmit by telegraph the order for the *cold-wave* signals before the receipt of the Farmers' Bulletin.

Notice of a "cold wave" is given in the Farmers' Bulletin, which is sent daily to your post office or by telegraph over lines of railroads co-operating in this work, and the flag should be displayed at once and should be taken down at the expiration of 24 hours, unless a second warning is received.

Many railroads in the country, co-operating with this service, receive the notice of "cold waves" by telegraph, and you may be able to make arrangements by which the warning of the approach of "cold waves" will be sent to you in advance of the receipt of the Farmers' Bulletin.

This office has not the necessary funds to pay for telegraphing the warning to each of the thousands of post offices in the country, and it is, therefore, at present necessary for you to secure your notice either from the Farmers' Bulletin or from some railroad company at or near your place.

I am, very respectfully, your obedient servant,

W. B. HAZEN,
Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

During November one hundred and eight cold-wave signals were displayed, and except in two instances, viz., at Chicago and Indianapolis (for the 4–6th) all of these were justified.

The following notes from the reports of the observers indicate the value of these warnings, and the favor with which they are received by the general public:

Washington, District of Columbia: "the signal (23–25th) was ordered twenty-four hours in advance of the cold wave; favorable comments were made by the press."

Louisville, Kentucky: "Hamilton Brothers, pork dealers, started killing in anticipation of colder weather (signal 16–18th). The flag was displayed thirty hours in advance of the cold wave, and attracted considerable attention; its justication elicited favorable comment."

Logansport, Indiana: "the cold-wave signals displayed during the month were justified and were of vast benefit to our people; both the press and the general public are pleased that these warnings are given by the department."

Leavenworth, Kansas: "decided benefits were derived from the display of the cold-wave signal from the 22–24th; commission men especially were enabled to profit by it."

Toledo, Ohio: "the display of cold-wave signals during the month was of especial benefit to gardeners, fishermen, roofers, and dealers in oysters, fruit, and vegetables. The warnings were furnished to the officials of the various railroads centering here, by whom they are distributed over a wide area. As soon as arrangements are completed this information will reach more than two hundred towns in Ohio, Michigan, and Indiana."

Auburn, Alabama: "much interest is taken in the predictions; the displays are watched for impatiently in the morning, and the people govern their daily movements by them. They are remarkably accurate. The citizens of this state are very grateful to the Chief Signal Officer for this liberality."

Chattanooga, Tennessee: "the displays are noted closely by the community, and due action taken, especially by coal dealers in laying in supplies, &c.

Burlington, Iowa: "the display (22–24th) was in every way justified; the temperature fell 42° in ten hours."

Philadelphia, Pennsylvania: "the weather following the cold-wave signal displays fully justified the same; the warnings were favorably commented upon by all newspapers published in this city."

Albany, New York: "many expressions of favor concerning the cold-wave signal displays."

Baltimore, Maryland: "the information furnished during the month through the display of cold-wave signals has been deemed of great value by many oyster packers and fruit importers."

Buffalo, New York: "the warning from this display was timely and correct, and the benefits derived were general."

Milwaukee, Wisconsin: "the display (22–24th) was of great

value to the commercial interests of this city and vicinity. Copies of the order were posted on the Signal Service bulletin-boards and given to the press, and to several railroad companies, by whom they telegraphed over this state and portions of Minnesota and Iowa. Shippers of fruit saved considerable perishable property by heeding the warning."

Professor P. H. Mell, jr., director of the Alabama Weather Service, in his report for November, 1884, referring to weather forecasts by means of railway signals, reports the following:

A careful examination of the meteorological reports from all quarters of the state shows the verification of the weather predictions to be 92 per cent. and of the temperature 70 per cent.

The director is gratified to perceive that the public are greatly interested in these predictions. Several stations not on the line of the railroads desire the telegrams, and stations in Georgia on the Atlanta and West Point road have sent a request for them. The stations already equipped complain greatly if the telegrams are not received promptly; and all reports show a due appreciation of the practical benefits derived from the system, and of the liberality of the Chief Signal Officer in so generously furnishing Alabama with the full advantages of these predictions.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of the water at the several stations; the monthly range of water temperature; the average depth at which the observations were made; and the mean temperature of the air at the stations:

Temperature of water for November, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	56.9	46.9	10.0	2	4	45.4
Alpena, Michigan	38.8	30.5	8.3	11	9	31.7
Augusta, Georgia	67.0	49.8	17.2	5	2	54.8
Baltimore, Maryland	58.3	46.4	11.9	10	1	46.4
Block Island, Rhode Island	52.4	44.2	8.2	6	9	45.0
Boston, Massachusetts	48.3	31.0	17.3	21	10	41.1
Buffalo, New York	51.8	37.5	14.3	10	7	37.9
Canby, Fort, Washington Territory	52.3	48.0	4.3	17	11	50.9
Cedar Keys, Florida	71.3	60.2	11.1	9	7	63.7
Charleston, South Carolina	68.8	58.6	10.2	40	4	59.1
Chicago, Illinois	48.3	33.8	14.5	7	3	39.6
Chincoteague, Virginia	61.9	44.3	17.6	3	11	49.0
Cleveland, Ohio*	52.4	39.4	13.0	14	0	38.8
Detroit, Michigan	47.2	33.6	13.6	23	9	39.6
Delaware Breakwater, Delaware	69.2	47.2	22.0	8	8	48.0
Duluth, Minnesota	42.5	35.3	7.2	9	11	39.1
Eastport, Maine	47.4	43.1	4.3	15	11	36.4
Escanaba, Michigan	46.8	35.0	11.8	17	5	30.3
Galveston, Texas	68.0	56.1	11.9	12	4	61.9
Grand Haven, Michigan	45.6	32.4	13.2	19	0	38.3
Indianola, Texas	72.5	57.5	15.0	8	4	62.7
Jacksonville, Florida	70.7	64.2	6.5	18	0	61.7
Key West, Florida	79.6	75.4	4.2	17	2	74.9
Mackinaw City, Michigan	45.9	35.1	10.8	10	0	34.3
Macon, Fort, North Carolina	67.8	55.5	12.3	6	4	55.8
Marquette, Michigan	42.8	37.0	5.8	10	0	31.3
Milwaukee, Wisconsin	48.4	33.4	15.0	8	0	35.0
Mobile, Alabama	69.8	57.7	12.1	15	7	55.5
New Haven, Connecticut	51.3	41.4	9.9	15	11	40.9
New London, Connecticut	53.8	46.2	7.6	11	6	42.9
New York City	53.0	43.5	9.5	15	10	43.2
Norfolk, Virginia	59.4	51.4	8.0	17	0	52.6
Pensacola, Florida	71.9	59.3	12.6	17	3	57.6
Portland, Maine	47.4	38.9	8.5	16	4	39.1
Portland, Oregon	50.2	44.7	5.5	52	6	46.7
Sandusky, Ohio	58.0	33.9	24.1	13	0	40.0
Sandy Hook, New Jersey	55.3	43.1	12.2	1	6	44.5
San Francisco, California	57.5	55.3	2.2	31	10	56.5
Savannah, Georgia	68.7	56.6	12.1	10	5	58.7
Smithville, North Carolina	67.3	58.0	9.3	10	8	55.5
Toledo, Ohio	47.5	32.4	15.1	10	8	40.0
Wilmington, North Carolina	67.0	56.0	11.0	18	4	57.1

* Record for twenty-eight days.

ATMOSPHERIC ELECTRICITY.

AURORAS.

But few auroral displays, none of which were noted for brilliancy or extent of observation, occurred during November. On the evening of the 2d, a display occurred which was observed at Fort Bennett, Dakota; Winnipeg, Manitoba; Ann Arbor, Michigan; Toronto, Ontario; Mountainville, New York, and at numerous stations in New England. The following reports relate to this display.

Fort Bennett, Dakota, 2d: a faint auroral display was observed in the northwestern sky at 7.20 p. m.

Ann Arbor, Michigan, 2d: auroral light visible from 6 to 8 p. m.

Toronto, Ontario: auroral light was observed on the 2d, viz: from 8.30 to 8.15 p. m., fine display of streamers and patches of aurora; 9.30 p. m. fine curtain moving west. (Canadian Weather Review.)

Providence, Rhode Island, 2d: auroral beams were seen at 9 p m., during bright moonlight; no arch was discernible.

Mountainville, New York, 2d: "aurora streaming up from west to east during the evening."

Point Judith, Rhode Island, 2d: an auroral display began at 6.42 p. m., at first consisting of streamers of yellow, blue, and green, having a waving motion. At 7.08 p. m. the streamers disappeared, leaving a diffused light which remained until 10.05 p. m., when a narrow arch appeared for about five minutes; between 10.12 and 10.25 p. m. beams of bright yellow were observed; at midnight only a faint light remained.

Thatcher's Island, Massachusetts, 2d: traces of an aurora were observed from 6.30 to 9.30 p. m.

Eastport, Maine, 2d: a brilliant auroral arch of about 25° altitude was observed from 6 to 7 p. m.

Cornish, Maine, 2d: auroral streamers were visible at 5.30 p. m.

Block Island, Rhode Island, 2d: a brilliant auroral arch, extending from northwest to northeast and to an altitude of 10°, was observed at 6.45 p. m.; beams of bright blue, changing to light green, shot up from the arch to an altitude of 30°.

Cambridge, Massachusetts, 2d: fine auroral streamers were observed at 6.30 p. m.

Portland, Maine, 2d: a few auroral streamers were observed from 9.15 to 9.45 p. m., at the latter hour clouds obscured the display.

Gardiner, Maine, 2d: a brilliant aurora appeared at 6.15 p. m.; at 6.30 two arches were visible with beams shooting upward; at 7 p. m. the arches had disappeared but a bright light was still visible, although the full moon shone brightly; at 7.15 the aurora had disappeared.

Auroral displays occurred on other dates as follows:

Omaha, Nebraska: the operators of the Western Union telegraph company report that during the night of the 1–2d, the telegraph wires were sensibly affected; the disturbance was supposed to have been due to the influence of an aurora.

Woodstock, Vermont: an aurora is reported to have been observed on the 8th.

Fort Totten, Dakota: a faint auroral light was observed in the north from 6.30 to 10 p. m. on the 9th.

Cambridge, Massachusetts, 9th: a low auroral arch was visible at 8.15 p. m.; at 11 p. m. it had disappeared.

Gardiner, Maine, 9th: faint auroral beams were observed at 6.45 p. m.; the display disappeared soon after 9 p. m.

An auroral display was also observed at Cornish, Maine, on the evening of the 9th.

Fort Totten, Dakota: light traces of an aurora were observed at 9 p. m. on the 10th.

North Colebrook, Connecticut: an aurora was observed at 11.50 p. m. on the 11th.

At Winnipeg, Manitoba, auroral displays were observed on the evenings of the 13th and 14th.

Moorhead, Minnesota, 17th: a faint aurora was visible from 8.45 to 10.15 p. m., consisting of a pale glow reaching from north to northeast, and to an altitude of 35°; a few slender streamers were observed from 8.45 to 9.10 p. m.

At Fort Totten, Dakota, an auroral arch was observed in the north from 8.30 to 11.20 p. m. on the 17th; and at Cambridge, Massachusetts, at 11 p. m. on the same date, a low auroral arch was visible.

Manistique, Michigan: a diffuse auroral light was visible in the north on the evening of the 17th, from 8 p. m. until midnight.

Gardiner, Maine, 18th: bright aurora at 8 p. m.; at 9 p. m., it had disappeared.

Table of miscellaneous meteorological data for November, 1884—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer	Date.	Lowest barometer	Date.	Monthly range of barometer.	Temperature of the air (in degrees Fahrenheit): Monthly mean.	Departure from normal.	Extremes: Max.	Date.	Mean max	Min.	Date.	Mean min	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal	Winds: Total movement.	Prevailing direction.	Max. velocity: Miles p. hr	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.																																			
Eastport	61	29.88	—.12	29.95	30.50	22	29.16	29	1.34	36.4	+0.8	54.0	24	43.1	16.0	19	30.1	38.0	26.0	24	2.5	20	76.5	29.6	5.95	+1.34	7,282	nw.	40	s.	24	11	10	14	6
Portland	45	29.94	—.10	29.99	30.49	19	29.30	29	1.20	39.1	+1.2	58.8	11	46.7	22.8	19	32.7	36.0	26.0	24	6.0	19	71.7	30.2	2.25	—1.39	6,238	w.	40	s.	24	12	8	13	9
Mount Washington	6,279	23.51	....	30.07	30.53	22	29.51	24	1.02	16.8	0.0	37.1	5	24.4	—8.9	25	8.4	46.0	41.0	24	3.9	1	95.8	15.7	7.99	+1.47	23,690	nw.	†	s.	23	18	2	10	18
Thatcher's Island	48	....	....	....	....	..	....	...	......	41.9	+0.6	60.5	24	49.2	21.0	25	34.6	39.5	25.5	29	......	...	......	......	2.67	—4.64	....	....	...	....	...	8	...	...	...
Boston	122	29.89	—.11	30.03	30.48	22	29.33	29	1.15	41.1	+1.4	65.1	23	50.0	21.5	25	32.6	43.6	38.2	24	10.0	27	70.7	31.5	3.03	—2.17	8,732	w.	47	s.	23	9	8	12	10
Point Judith	....	....	....	....	....	...	....	...	......	42.7	....	58.0	...	50.1	22.0	25	35.4	36.0	......	...	......	...	......	......	3.95	....	....	....	...	....	...	11	...	...	...
Block Island	27	30.02	....	30.05	30.50	22	29.33	29	1.18	45.0	+0.2	63.2	5	52.6	26.8	25	38.1	36.4	27.3	24	6.6	11	79.4	38.8	5.93	—0.05	10,450	nw.	42	ne.	19	11	8	12	10
Narragansett Pier	....	....	....	....	....	...	....	...	......	41.8	....	60.0	...	50.7	19.0	25	33.0	41.0	......	...	......	...	......	......	4.41	....	....	....	...	....	...	11	...	...	...
New London	47	30.02	—.08	30.07	30.53	3	29.41	29	1.12	42.9	+1.8	60.6	17	51.8	22.8	25	35.0	37.8	30.8	24	3.9	28	76.3	35.6	2.78	—1.44	5,439	w.	49	s.	23	10	6	10	14
New Haven	107	29.94	....	30.06	30.48	22	29.45	28	1.02	40.9	—0.1	62.0	23	50.2	17.5	25	31.7	44.5	32.4	24	10.8	20	73.4	32.5	2.24	—1.91	5,667	sw.	34	s.	23	12	6	9	15
Middle Atlantic states.																																			
Albany	75	29.97	—.11	30.06	30.47	3	29.45	23	1.02	38.4	—0.8	68.0	23	46.6	20.0	19	31.7	48.0	33.0	24	4.0	6	62.7	26.0	3.44	+0.95	5,097	sw.	32	s.	23	11	15	9	6
New York	164	29.89	—.12	30.07	30.47	22	29.35	29	1.12	43.2	—2.5	62.6	15	51.5	20.8	25	36.3	41.8	31.7	24	6.4	30	71.4	34.0	3.44	+0.10	8,231	w.	40	w.	24	10	7	9	14
Sandy Hook	28	30.06	—.09	30.09	30.42	3	29.49	28	0.99	44.5	—0.4	62.4	23	51.8	22.1	25	37.8	40.3	27.8	24	5.7	19	71.9	35.5	3.57	—0.55	12,783	w.	64	nw.	24	10	6	10	14
Barnegat City	22	30.05	—.11	30.07	30.48	22	29.43	28	1.05	46.4	+2.4	65.6	23	55.2	24.6	25	38.1	41.0	35.0	24	8.4	28	80.9	40.6	2.68	—1.70	9,970	nw.	52	s.	23	7	6	7	17
Little Egg Harbor	....	....	....	....	....	...	....	...	......	46.2	....	66.7	2	54.8	21.3	25	37.7	45.4	......	...	......	...	......	......	2.32	....	....	....	...	....	..	6	...	...	...
Atlantic City	13	30.06	—.12	30.07	30.46	22	29.38	28	1.08	45.4	+1.0	69.9	2	54.5	20.0	25	37.1	49.9	33.0	24	4.0	28	80.1	39.2	4.03	+0.65	5,558	nw.	42	s.	23	7	7	6	17
Cape May	27	30.03	....	30.08	30.46	22	29.40	28	1.06	48.3	+1.9	69.0	2	55.8	22.0	25	40.4	47.0	30.5	25	6.5	28	77.6	41.3	2.30	—1.43	11,818	nw.	56	w.	24	9	6	10	14
Philadelphia	117	29.97	—.11	30.10	30.48	3	29.44	29	1.04	43.8	+0.5	65.9	2	53.5	22.0	25	36.5	43.9	30.9	24	4.5	30	67.7	32.9	2.31	—0.96	7,048	n.	36	nw.	29	8	9	9	12
Baltimore	45	30.06	—.11	30.11	30.48	22	29.51	28	0.97	46.4	+1.0	71.3	2	55.0	26.1	25	39.0	45.2	28.5	24	5.3	28	61.9	33.1	3.09	+0.05	3,934	nw.	27	se.	23	8	9	6	15
Washington City	106	30.00	—.10	30.12	30.48	3	29.50	28	0.98	44.7	+0.5	73.6	2	55.4	24.5	25	35.6	49.1	31.3	17	3.9	28	70.3	34.6	3.42	+0.58	3,874	nw.	25	n.	29	8	8	6	16
Delaware Breakwater	20	30.08	—.09	30.10	30.47	22	29.40	28	1.06	48.0	+0.6	69.4	2	54.8	28.0	25	41.5	41.4	22.7	1	6.3	30	75.6	39.9	2.42	+0.18	11,763	nw.	54	se.	23	8	7	8	15
Ocean City	....	....	....	....	....	...	....	...	......	48.1	......	68.0	2	56.3	24.0	25	39.8	44.0	......	...	......	...	......	......	2.72	....	....	....	...	....	...	8	...	...	...
Chincoteague	8	30.08	—.11	30.09	30.47	22	29.44	28	1.03	49.0	+1.4	72.0	2	57.1	25.0	25	41.2	47.0	28.5	24	6.5	23	77.9	41.7	2.12	—0.96	7,250	nw.	36	nw.	24	10	6	6	18
Cape Henry	16	30.09	—.10	30.11	30.44	22	29.45	28	1.00	53.2	+1.2	73.8	2	61.9	36.0	25	46.6	37.8	29.8	24	5.6	20	71.9	43.8	0.58	—3.89	8,874	ne.	36	nw.	5	7	8	9	13
Norfolk	30	30.08	—.09	30.11	30.41	22	29.49	28	0.93	52.6	+2.8	73.8	2	60.9	36.3	21	45.1	37.5	36.2	11	5.0	16	72.0	43.0	0.74	—2.84	4,574	ne.	25	s.	23	7	8	7	15
Lynchburg	652	29.41	—.09	30.13	10.48	22	29.52	28	0.96	45.9	—0.4	72.0	2	56.7	27.0	22	30.0	45.0	33.5	10	6.1	19	63.5	32.2	3.63	+0.31	2,356	nw.	20	nw.	5	6	7	7	10
South Atlantic states.																																			
Kitty Hawk	22	30.10	—.09	30.11	30.44	22	29.48	28	0.96	55.3	+2.4	69.8	23	61.2	34.9	25	48.6	35.0	25.0	24	3.0	15	76.9	47.4	7.14	+2.09	10,171	ne.	48	nw.	16	9	10	9	11
Hatteras	12	30.08	—.10	30.09	30.40	7	29.53	28	0.87	56.4	+0.5	74.8	4	62.4	40.9	25	50.8	33.9	22.4	24	5.3	15	79.6	49.6	13.02	+7.42	6,631	ne.	46	nw.	16	11	7	15	8
Fort Macon	11	30.10	—.09	30.11	30.43	7	29.53	28	0.90	55.8	+0.3	70.1	3	62.7	37.6	25	48.9	32.0	24.0	24	6.0	23	79.2	48.9	3.06	+0.34	8,375	ne.	55	sw.	29	14	4	15	11
New River Inlet	....	....	....	....	....	...	....	...	......	56.1	....	74.0	1	66.1	30.0	21	46.2	44.0	......	...	......	...	......	......	2.82	....	....	....	...	....	...	8	...	...	...
Wilmington	52	30.06	—.08	30.12	30.44	7	29.55	28	0.89	57.4	+2.8	76.5	19	67.6	35.0	25	48.1	41.5	25.0	25	11.5	23	68.0	46.0	1.96	—0.86	3,390	ne.	28	sw.	29	6	4	15	11
Smithville	34	30.08	—.08	30.12	30.42	...	29.59	28	0.83	55.5	+0.4	71.2	4	63.8	32.3	25	45.7	38.9	25.9	24	6.9	3	75.8	47.3	1.81	—1.39	5,518	ne.	34	sw.	..	8	3	13	4
Charlotte	808	29.27	—.06	30.15	30.48	7	29.54	28	0.94	50.6	+0.9	78.8	1	60.5	29.2	7	41.3	49.6	39.4	1	9.2	28	65.3	38.0	4.73	+0.79	2,985	ne.	23	s.	23	6	6	6	18
Atlanta	1,129	28.96	—.05	30.18	30.47	7	29.56	28	0.91	51.6	+0.2	70.0	2	60.6	30.4	25	42.0	39.6	26.2	8	7.4	26	57.2	35.2	2.84	—2.14	6,289	nw.	32	w.	28	9	5	9	16
Augusta	183	29.86	—.08	30.16	30.51	7	29.56	28	0.95	54.8	+0.7	77.0	23	67.4	33.5	25	43.6	43.5	32.2	12	7.5	19	64.1	41.1	1.71	—2.58	2,090	nw.	24	sw.	28	5	8	14	8
Charleston	52	30.05	—.08	30.11	30.39	7	29.60	28	0.79	59.1	+1.6	73.9	3	67.2	40.5	7	51.8	33.4	24.4	16	7.4	4	72.4	49.3	1.49	—2.02	*4,161	ne.	24	sw.	23	8	5	10	15
Savannah	87	30.03	—.07	30.12	30.40	7	29.58	28	0.82	58.7	—0.5	75.7	4	67.6	37.0	25	50.0	38.7	28.5	25	6.5	19	66.4	46.0	1.72	—0.88	4,326	w.	30	nw.	29	6	4	11	15
Jacksonville	43	30.06	—.06	30.11	30.30	6	29.71	28	0.59	61.7	—0.5	78.8	4	70.5	39.0	25	54.1	39.8	29.1	25	4.6	28	80.3	54.8	5.43	+2.48	3,941	ne.	26	w.	28	10	10	11	9
Washwoods, N. C.	....	....	....	....	....	...	....	...	......	53.6	....	74.0	13	63.1	31.0	7	44.1	43.0	......	...	......	...	......	......	3.25	....	....	....	...	....	...	10	...	...	...
Scott's Hill, N. C.	....	....	....	....	....	...	....	...	......	54.1	....	79.2	4	64.6	30.5	25	43.5	48.7	......	...	......	...	......	......	....	....	....	....	...	....	...	...	...	...	...
Florida peninsula.																																			
Sanford	50	30.00	....	30.04	30.17	24	29.78	28	0.39	66.9	....	85.5	1	76.9	44.4	25	56.8	41.1	32.7	17	10.0	20	80.6	59.8	1.45	....	4,584	n.	26	n.	6	11	9	14	7
Cedar Keys	22	30.07	—.06	30.09	30.24	11	29.73	28	0.52	63.7	—0.7	78.0	2	71.8	42.0	25	57.0	36.0	27.4	25	7.8	...	74.8	54.7	3.06	—0.41	6,002	n.;ne.	31	s.	28	8	5	12	13
Key West	20	30.00	—.04	30.02	30.12	24	29.90	7	0.22	74.9	+0.1	82.9	3	77.9	69.3	20	72.0	13.6	9.8	27	3.1	15	85.7	70.1	6.03	+3.77	7,720	ne.	26	nw.	8	16	6	21	2
Eastern Gulf states.																																			
Montgomery	219	29.91	—.05	30.15	30.44	6	29.58	28	0.86	54.0	—1.3	77.7	13	66.6	32.1	25	42.6	45.6	34.8	10	13.6	20	67.6	41.4	2.67	—0.96	3,016	nw.	24	w.	28	8	5	10	15
Pensacola	30	30.10	—.03	30.13	30.38	6	29.67	20	0.71	57.6	—2.2	75.7	4	67.8	39.7	24	48.6	36.0	26.8	8	10.7	4	65.3	44.8	5.16	+0.78	4,597	n.	32	s.	23	7	4	11	15
Mobile	35	30.11	—.03	30.15	30.41	6	29.65	28	0.76	55.5	—3.0	78.7	3	67.2	34.1	25	44.7	44.6	32.1	10	11.0	18	81.8	48.8	4.12	—0.58	4,289	n.	28	se.	23	9	3	9	18
Vicksburg	244	29.92	—.01	30.19	30.56	6	29.71	22	0.85	54.7	—0.7	75.3	...	65.5	32.2	24	44.2	43.1	30.9	8	9.5	18	64.5	41.8	2.48	—3.57	3,511	n.	23	w.	22	7	5	7	18
New Orleans	52	30.07	—.02	30.13	30.44	6	29.69	28	0.75	59.7	—1.5	75.6	22	66.7	42.2	7	52.2	33.4	18.7	25	9.1	30	66.7	47.5	3.13	—2.09	4,709	ne.	28	ne.	22	5	4	10	16
Western Gulf states.																																			
Fort Smith*	451	29.68	00	30.17	30.56	6	29.63	22	0.93	49.7	+1.4	77.8	1	63.0	22.5	24	40.5	55.3	35.9	9	6.5	12	72.3	40.1	5.19	—2.25	2,607	e.	24	w.;nw	23	5	7	10	11
Little Rock	298	29.82	—.04	30.16	30.58	6	29.61	22	0.98	51.8	+0.4	74.2	3	62.3	28.0	24	42.6	46.2	28.0	7	8.1	18	77.8	45.5	2.83	—2.48	2,477	nw.	24	sw.	30	9	4	10	16
Shreveport	227	29.93	+.01	30.18	30.57	6	29.65	22	0.92	53.0	—1.6	76.2	3	65.2	30.8	24	43.0	45.4	33.0	10	9.5	27	74.5	43.8	5.73	+0.86	2,320	nw.	21	nw.	30	7	4	15	11
Palestine	533	29.61	.00	30.18	30.57	6	29.69	22	0.88	54.5	—0.8	77.6	2	64.7	32.1	...	45.2	45.5	31.0	21	7.7	18	67.3	43.0	2.93	—1.76	5,934	s.	24	s.	17	5	5	8	17
Indianola	26	30.12	+.02	30.15	30.49	7	29.74	22	0.75	62.7	+0.5	76.0	...	68.3	44.1	24	57.2	32.0	19.0	...	6.0	2	80.0	56.1	2.85	—0.27	8,862	e.	40	nw.	28	4	1	16	13
Galveston	40	30.11	+.02	30.15	30.50	6	29.68	2	0.82	61.9	0.0	75.0	4	68.0	44.5	24	56.5	30.5	22.0	18	5.7	2	76.0	53.9	4.25	—1.02	7,327	e.	37	nw.	22	6	1	15	14
Rio Grande valley.																																			
Rio Grande City	230	29.94	+.03	30.20	30.53	6	29.80	22	0.73	64.6	+1.2	83.6	1	73.8	40.6	29	57.4	43.0	35.8	29	5.0	19	68.8	52.8	0.03	—0.97	3,033	nw.	21	nw.	29	1	5	16	9
Brownsville	57	30.05	.00	30.11	30.37	6	29.69	22	0.68	65.5	+0.1	83.0	22	74.9	48.0	30	58.8	35.0	22.8	29	9.8	5	81.6	59.1	3.46	+1.04	4,532	n.	24	sw.	29	10	10	11	9
Tennessee.																																			
Nashville	549	29.55	—.05	30.15	30.54	6	29.69	28	0.85	48.1	0.0	73.1	3	59.6	27.3	24	37.5	45.8	32.6	9	9.0	20	73.5	39.2	1.57	—2.49	3,547	e.	40	se.	23	4	5	12	13
Memphis	321	29.82	—.04	30.16	30.59	6	29.60	22	0.99	51.2	+1.9	71.2	...	61.0	23.7	24	41.4	47.5	27.5	25	8.7	19	71.6	41.5	2.08	—2.64	3,315	w.	28	nw.	4	8	3	12	15
Chattanooga	783	29.32	—.06	30.17	30.49	6	29.58	28	0.91	48.7	—1.1	68.9	2	59.5	27.1	25	38.5	42.0	31.0	9	7.0	18	70.7	38.5	1.75	—3.47	2,927	nw.	24	sw.	23	4	5	10	15
Knoxville	980	29.11	—.07	30.18	30.51	6	29.59	28	0.92	46.3	0.0	71.3	2	58.4	25.3	25	35.3	46.0	34.9	11	6.5	18	71.3	53.8	1.31	—3.08	2,711	ne.	28	sw.	23	6	5	7	18
Ohio valley.																																			
Pittsburg	766	29.25	—.10	30.10	30.43	6	29.55	23	0.88	42.7	+1.9	69.8	4	53.3	18.9	...	34.0	50.9	34.8	9	5.3	30	73.0	33.9	1.18	—1.35	4,862	w.	28	w.	23	14	12	12	6
Columbus	805	29.22	—.08	30.11	30.48	6	29.56	23	0.92	40.7	—1.1	64.6	10	50.2	15.3	24	32.7	49.0	36.0	23	6.0	18	76.3	33.2	0.99	—2.71	5,277	sw.	42	sw.	23	6	10	10	10
Indianapolis	753	29.28	—.05	30.12	30.53	6	29.51	23	1.02	41.5	+0.5	66.8	1	50.2	12.3	24	33.4	54.5	41.5	25	6.4	30	77.9	34.6	1.46	—2.40	4,065	w.	24	w.	23	8	7	10	13
Greencastle	....	29.14	....	....	....	...	....	...	0.99	40.9	....	66.1	1	49.6	9.7	24	33.0	56.4	35.4	23	6.4	3	77.4	34.0	1.73	....	5,465	sw.	29	sw.	23	9	9	8	13
Cincinnati	620	29.46	—.07	30.15	30.54	6	29.56	23	0.98	44.3	—0.7	66.3	10	53.4	18.6	24	36.5	47.7	32.5	23	4.9	19	76.4	36.8	1.23	—2.22	3,951	sw.	23	w.	23	8	9	9	12
Louisville	530	29.54	—.06	30.13	30.53	6	29.60	23	0.94	48.0	+2.9	69.1	10	56.9	19.5	24	39.7	49.6	30.7	23	6.3	30	71.1	38.5	1.86	—1.87	5,031	s.	36	sw.	23	6	8	11	13
Lower lake region.																																			
Detroit	661	29.33	—.06	30.07	30.41	6	29.37	23	1.05	39.6	+2.0	62.2	23	46.5	14.4	24	32.4	47.8	35.0	23	4.1	18	71.2	30.7	1.74	—1.13	7,492	sw.	40	se.	23	14	14	6	10
Toledo	651	29.36	—.05	30.09	30.46	6	29.41	23	1.05	40.0	+0.4	62.5	1	48.5	15.2	24	31.9	47.3	32.0	23	7.2	18	74.6	32.3	1.39	—1.58	6,165	sw.	40	sw.	23	9	13	9	8
Sandusky	639	29.38	—.00	30.10	30.46	6	29.46	23	1.01	40.0	—1.3	65.0	10	47.0	14.0	...	33.3	51.0	32.0	23	3.0	18	71.2	31.1	1.01	—2.67	10,093	sw.	44	w.	23	9	13	10	7
Cleveland	690	29.32	—.07	30.09	30.41	...	29.50	23	0.90	38.8	—0.4	67.9	1	47.3	12.3	24	31.4	55.6	32.8	23	5.1	11	77.6	32.0	1.59	—1.04	7,794	s.	35	w.	23	12	13	11	6
Erie	681	29.31	—.07	30.07	30.43	3	29.42	23	1.01	40.8	+0.3	64.7	10	47.8	15.8	24	33.5	48.9	26.3	23	5.1	29	78.6	34.5	4.91	+0.49	8,569	sw.	40	s.	23	12	17	9	4
Buffalo	690	29.28	—.06	30.05	30.43	3	29.43	23	1.00	37.9	+0.4	61.0	10	44.8	10.6	24	31.6	50.4	30.5	24	5.3	12	82.9	33.1	2.51	—1.04	9,979	w.	60	w.	23	13	18	7	5
Rochester	621	29.35	—.10	30.05	30.43	3	29.46	23	0.96	36.8	—0.1	64.9	10	46.5	15.4	24	30.8	49.5	30.8	9	6.2	12	77.7	30.1	1.32	—1.59	8,939	sw.	48	w.	7	12	20	6	4
Oswego	334	29.65	—.14	30.02	30.40	3	29.39	23	1.02	36.9	—1.9	62.3	23	46.0	17.5	24	30.5	44.8	29.3	5	5.3	30	74.8	29.4	2.09	—1.16	9,720	se.	38	w.	24	17	22	4	4
Upper lake region.																																			
Duluth	644	29.31	+.03	30.10	30.46	17	29.60	26	0.85	29.1	0.0	60.3	12	36.7	—17.0	24	21.0	77.3	28.2	24	5.2	2	76.8	22.3	0.95	—0.86	6,152	w.	44	nw.	23	8	6	11	13
Marquette	673	29.27	.00	30.04	30.41	17	29.51	26	0.90	31.3	—0.1	64.0	14	38.1	—6.3	24	22.7	70.3	30.3	23	4.0	5	71.1	22.7	2.77	+0.47	8,390	w.	36	sw.	6	13	13	10	7
Escanaba	612	29.32	—.03	30.02	30.38	17	29.42	23	0.96	30.3	—0.7	62.6	14	38.1	—5.0	24	23.0	67.6	38.9	23	4.6	1	74.5	23.0	2.14	—0.74	6,790	nw.	32	nw.	23	14	11	13	6
Milwaukee	697	29.30	—.01	30.09	30.44	6	29.41	23	1.03	35.0	—0.3	62.9	9	42.7	—3.7	24	27.2	66.6	47.0	23	5.8	22	70.1	27.9	1.45	—0.73	7,910	w.	41	nw.	23	10	9	11	10
Chicago	661	29.35	—.03	30.09	30.48	6	29.43	23	1.05	39.6	+1.2	64.4	9	48.8	5.4	24	33.1	59.0	42.1	23	5.5	10	75.3	32.1	1.80	—1.11	5,441	sw.	22	nw.	23	9	7	14	9
Grand Haven	620	29.37	—.02	30.07	30.44	6	29.34	23	1.10	38.3	+0.9	58.8	9	45.1	12.0	24	31.1	40.8	32.2	23	3.9	11	75.9	31.1	2.61	—0.73	7,732	sw.	39	nw.	23	12	14	10	5
Mackinaw City	605	29.33	—.04	30.02	30.39	3	29.29	23	1.10	34.3	—2.1	57.1	9	40.1	12.0	24	28.5	45.1	27.7	23	5.8	25	78.1	20.0	2.89	—5.75	8,720	nw.	34	nw.	23	13	20	8	2
Alpena	609	29.30	—.08	30.00	30.36	18	29.19	23	1.17	31.7	—0.3	58.0	14	38.8	10.1	24	26.2	48.0	29.0	14	0.0	24	84.4	27.4	2.15	—2.79	6,931	w.	32	w.	23	11	12	15	3
Port Huron	633	29.31	—.09	30.03	30.36	3	29.31	23	1.05	34.7	—1.5	57.0	...	42.5	10.6	25	27.9	46.4	27.3	23	6.2	19	83.2	29.7	2.34	—0.30	6,661	s.	37	w.	23	8	10	12	8

Table of miscellaneous meteorological data for November, 1884—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure.								Temperature of the air (in degrees Fahrenheit).												Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal	Winds.				No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.						Daily ranges.								Total movement.	Prevailing direction.	Max. velocity.					
					Highest barometer	Date.	Lowest barometer	Date.				Max.	Date.	Mean max	Min.	Date.	Mean min	Monthly range	Greatest.	Date.	Least.	Date.						Miles p.hr	Direction.	Date.				
Extreme northwest.																																
Fort Buford	1,930	28.03	.60	30.19	30.55	16	29.69	26	0.86	29.3	+ 5.5	61.9	6	41.5	— 9.0	23	19.2	70.9	33.4	8	11.1	17	77.0	22.5	0.31	—0.06	4,977	w.	44	nw.	19	4	9	14	7
Bismarck	1,694	28.26	.....	30.19	30.57	4	29.65	26	0.92	29.0	.....	64.4	6	41.5	— 9.5	23	18.9	73.9	30.1	6	8.5	28	80.5	23.2	0.73	.....	3,827	nw.	32	nw.	19	8	7	7	16
Fort Totten	.....	28.43	.....	.....	.....	...	.....	...	0.91	24.6	.....	62.0	12	34.5	—22.2	23	13.8	84.0	34	12	8	25	83.6	20.2	0.25	.....	7,670	nw.	44	nw.	19	9	5	13	12
Fort Yates	.....	.....	.....	.....	.....	...	.....	...	.....	30.1	.....	71.5	6	42.2	—21.3	23	18.1	92.8	.....	...	.....	...	.....	.....	0.58	.....	.....	.....	.....	.....	...	...	...	...
Moorhead	923	29.08	+.06	30.14	30.56	5	29.62	26	0.94	25.3	+ 2.3	56.3	12	35.1	—15	23	16.3	71.3	27.5	6	7.5	4	78.2	19.1	0.34	—0.44	7,150	sw.	32	nw.	19	7	9	12	9
Saint Vincent	804	29.18	+.03	30.11	30.58	17	29.53	19	1.05	22.1	+ 3.1	58.7	13	31.9	—19.1	23	12.6	77.8	33.7	24	5.0	4	81.0	17.0	0.42	—0.02	6,313	nw.	37	nw.	19	10	7	15	8
Upper Mississippi valley.																																
Saint Paul	801	29.20	+.03	30.11	30.47	5	29.65	26	0.83	31.9	+ 1.6	60.8	14	41.3	— 5.8	24	23.9	66.6	32.5	6	8.0	5	71.0	23.2	0.65	—0.77	2,976	nw.	20	nw.	...	6	9	10	11
La Crosse	735	29.28	.00	30.10	30.42	6	29.64	22	0.78	34.0	+ 0.5	62.0	9	42.4	— 4.0	24	26.8	66.0	30.5	23	7.0	5	71.7	25.7	1.45	—0.58	5,074	s.	32	n.	23	12	9	10	11
Dubuque	665	29.37	.....	30.12	30.48	6	29.52	22	0.97	36.3	— 1.8	64.6	9	46.8	— 1.2	24	27.4	65.8	42.0	23	5.7	1	68.2	20.4	1.43	—0.98	2,339	nw.	20	nw.	23	8	5	11	14
Davenport	615	29.42	—.03	30.11	30.51	6	29.49	22	1.02	40.3	+ 3.4	63.2	9	49.0	5.0	24	31.7	58.2	44.0	23	6.7	22	69.4	30.8	1.49	—0.66	5,265	nw.	28	nw.	23	4	6	13	13
Des Moines	849	29.19	—.01	30.14	30.53	5	29.69	26	0.84	37.6	+ 0.4	63.6	15	47.4	1.9	23	28.0	61.7	29.9	28	4.4	17	72.1	29.0	1.26	—1.56	3,458	n.	24	n.	23	6	4	13	13
Keokuk	618	29.43	—.03	30.12	30.52	6	29.50	22	1.01	40.6	+ 2.3	67.6	9	50.1	12.6	24	32.3	55.0	37.4	23	4.3	22	75.5	32.9	1.73	—0.39	5,051	nw.	26	nw.	23	5	6	12	12
Springfield	644	29.43	—.03	30.15	30.58	6	29.58	22	1.00	44.2	+ 2.8	66.9	9	53.6	13.6	24	30.2	53.3	39.3	23	8.5	3	68.9	34.0	1.30	—2.65	5,374	nw.	36	nw.	23	7	8	9	13
Saint Louis	583	29.50	—.07	30.14	30.58	6	29.53	22	1.05	47.1	+ 4.5	75.8	1	50.1	13.2	24	37.8	62.8	37.0	23	7.5	18	72.2	38.0	2.30	—0.49	8,316	s.	44	w.	23	10	7	12	11
Cairo	377	29.75	—.07	30.17	30.62	6	29.65	22	0.97	48.5	+ 2.4	69.5	3	57.8	22.2	24	41.3	47.3	27.5	23	6.9	2	73.5	40.0	2.41	—1.74	5,433	s.	38	nw.	23	7	6	9	15
Missouri valley.																																
Fort Bennett	1,510	28.51	.....	30.20	30.56	5	29.68	26	0.88	31.7	+ 3.7	69.8	6	47.7	—11.0	23	16.7	80.8	53.8	6	9.3	21	73.1	22.9	0.17	—0.15	3,819	nw.	32	nw.	19	2	4	13	13
Fort Sully	.....	.....	.....	.....	.....	...	.....	...	.....	35.5	.....	69.7	8	51.0	— 7.3	23	19.4	77.0	.....	...	.....	...	.....	.....	0.19	.....	.....	.....	.....	.....	...	...	...	...
Yankton	1,228	28.79	+.01	30.17	30.59	5	29.65	26	0.94	34.5	+ 2.8	66.3	8	46.4	— 3.0	23	24.0	69.3	38.0	8	5.6	25	73.7	20.3	0.02	—0.36	4,643	n.	28	n.	22	2	4	13	13
Huron	1,303	28.70	—.06	30.18	30.58	5	29.64	26	0.94	31.2	+ 1.0	66.9	8	45.4	—12.8	23	19.6	80.0	37	6	12	21	73.3	23.2	0.17	—0.20	5,407	s.	30	nw.	...	4	6	7	17
Omaha	1,113	28.93	—.02	30.17	30.58	5	29.70	26	0.88	39.3	+ 3.5	63.0	...	50.5	2.0	23	29.5	61	31	22	8	17	73.6	31.5	0.32	—1.08	5,372	n.	36	nw.	23	2	7	9	14
Leavenworth	842	29.20	—.05	30.14	30.52	5	29.60	22	0.92	43.1	+ 3.2	68.0	9	53.1	10.2	23	33.5	57.8	36.5	8	4.6	18	71.0	33.7	1.42	—1.15	3,943	s.	22	nw.	...	6	6	8	16
Northern slope.																																
Fort Assinaboine	2,710	27.22	+.04	30.32	30.49	15	29.81	26	0.68	37.6	+11.4	68.1	...	48.0	—12.8	23	23.7	80.9	40.9	24	8.1	26	59.8	23.4	0.42	—0.86	9,357	sw.	48	sw.	...	3	5	11	14
Fort Benton	2,700	27.30	.....	30.25	30.52	16	29.94	24	0.58	37.8	+11.6	71.6	7	53.5	— 7.8	23	24.8	79	48	23	10	16	56.9	22.3	0.29	—0.09	5,006	sw.	48	sw.	26	4	7	9	14
Fort Shaw	3,550	26.43	.....	30.25	30.48	15	29.97	24	0.50	39.1	+10.5	67.0	7	50.5	— 3.5	...	27.0	70.5	44.5	23	8.2	17	51.2	20.4	0.84	+0.19	7,685	sw.	47	sw.	26	3	4	11	15
Helena	4,044	25.92	+.02	30.24	30.49	30	29.95	20	0.54	39.4	+ 8.6	62.0	7	45.0	— 7.5	...	28.8	54.5	30.6	4	6.1	25	59.8	23.0	0.46	—0.28	3,664	w.	47	w.	26	4	4	13	13
Fort Custer	3,040	26.93	+.01	30.25	30.45	29	29.92	26	0.53	36.1	+ 5.5	67.1	7	50.8	—11.0	23	23.0	78.1	41.0	6	9.0	16	66.7	24.7	0.37	—0.15	3,863	e.	24	sw.	1	4	6	10	14
Fort Maginnis	4,340	25.61	.....	30.21	30.42	4	29.94	24	0.48	37.2	.....	69.3	7	48.0	— 5.0	22	27.6	74	35	23	11	22	52.1	20.9	0.31	.....	9,730	.....	...	sw.	26	6	6	11	13
Deadwood	4,600	25.43	+.08	30.27	30.50	12	29.95	26	0.55	36.1	+ 4.8	62.0	6	46.6	— 4.0	23	28.1	66.0	35.0	23	6.0	25	58.3	22.0	1.46	+0.46	2,079	ne.	15	e.	28	9	4	9	17
Cheyenne	6,089	24.07	+.07	30.30	30.53	7	29.94	21	0.59	36.2	+ 3.2	65.7	6	49.2	1.6	23	23.8	64.1	41.9	23	5.8	17	54.0	17.7	0.18	—0.09	8,476	nw.	56	nw.	26	3	5	5	20
North Platte	2,841	27.16	+.02	30.24	30.49	4	29.84	26	0.65	37.6	+ 3.4	66.0	14	51.6	4.5	23	25.1	61.5	42.0	24	7.6	29	65.6	25.7	0.04	—0.31	4,458	w.	28	.....	...	2	5	9	15
Middle slope.																																
Denver	5,294	24.82	+.05	30.32	30.55	5	29.92	21	0.63	42.1	+ 5.2	69.8	6	55.9	13.2	22	29.5	56.6	39.0	6	10.8	17	46.6	21.0	0.19	—0.53	4,820	s.	46	nw.	28	2	1	9	30
Pike's Peak	14,134	17.80	.....	30.46	30.78	6	30.12	22	0.66	13.3	+ 5.2	29.2	7	18.3	— 4.4	23	8.0	33.6	16.0	29	5.7	4	68.2	4.3	0.12	—1.98	10,182	nw.	52	nw.	23	4	3	8	19
Dodge City	2,517	27.49	+.01	30.23	30.52	4	29.78	25	0.76	41.6	+ 3.1	71.5	7	54.0	12.1	23	29.9	59.4	39.8	7	4.3	11	70.2	30.9	0.83	+0.19	6,358	nw.	38	n.	16	5	3	8	17
West Las Animas	3,905	26.11	+.02	30.22	30.47	5	29.75	21	0.72	38.4	+ 3.2	75.2	6	57.6	7.8	23	22.9	67.4	54.8	6	11.4	22	63.3	24.4	0.32	+0.04	3,847	w.	32	nw.	29	2	4	9	17
Fort Elliott	2,650	27.33	+.01	30.20	30.54	6	29.83	22	0.70	44.6	+ 4.5	72.3	8	58.3	19.5	23	33.1	58.8	38.7	6	5.6	11	72.9	35.0	2.14	+1.76	6,170	nw.	46	nw.	27	6	5	7	18
Cantonment	.....	.....	.....	.....	.....	...	.....	...	.....	35.4	.....	73.0	8	60.0	18.0	23	35.4	55.0	.....	...	.....	...	.....	.....	1.98	.....	.....	.....	.....	.....	...	8	...	...	...
Southern slope.																																
Fort Concho	1,900	28.20	.00	30.21	30.58	6	29.84	22	0.74	51.6	0.0	77.5	3	64.1	26.4	24	41.8	51	34	24	9	18	79.2	44.6	1.95	+0.73	5,229	s.	36	.....	...	6	5	11	14
Fort Stockton	3,010	27.09	+.02	30.21	30.49	6	29.83	21	0.67	52.6	+ 2.3	80.7	1	64.5	30.2	30	42.0	50.5	38.1	24	8.0	5	74.1	43.0	0.83	—0.05	4,524	se.	30	.....	...	7	6	9	15
Fort Davis	4,928	25.25	.....	30.17	30.37	6	29.84	21	0.53	50.2	+ 0.3	76.0	2	63.0	27.0	...	37.4	49.0	38.6	24	7.5	5	69.7	38.7	0.69	.....	5,231	sw.	32	.....	...	4	5	9	16
Fort Stanton	.....	.....	.....	.....	.....	...	.....	...	.....	36.1	.....	63.0	3	43.6	20.0	27	28.6	43.0	.....	...	.....	...	.....	.....	0.30	.....	.....	.....	.....	.....	...	3	...	...	...
Southern plateau.																																
Prescott	5,389	24.79	.....	30.18	30.35	6	29.83	21	0.53	43.4	+ 2.9	69.0	...	62.0	15.6	19	28.7	53.4	44.9	19	21.8	6	54.3	24.7	0.16	—0.38	2,137	.....	23	s.	23	1	0	7	23
Wickenburg	.....	.....	.....	.....	.....	...	.....	...	.....	50.5	+ 5.0	80.0	4	77.0	27.5	19	36.0	58.5	.....	...	.....	...	.....	.....	0.03	—0.58	.....	.....	...	.....	..	2	...	...	...
Phœnix	.....	.....	.....	.....	.....	...	.....	...	.....	61.6	+ 6.3	97.3	1	83.2	34.1	17	40.1	63.2	.....	...	.....	...	.....	.....	0.24	—0.22	.....	.....	...	.....	...	1	...	...	...
Fort Grant	4,856	25.27	.....	30.11	30.26	30	29.80	21	0.46	54.9	+ 5.7	78.1	1	67.7	30.7	23	45.5	41.4	29.1	28	10.1	21	45.6	32.8	0.53	—0.09	5,554	se.	48	e.	6	3	2	4	24
Fort Thomas	2,710	27.32	.....	30.16	30.39	6	29.86	21	0.53	51.4	+ 4.3	77.0	4	66.5	23.8	29	35.0	53.2	43.9	4	15.8	22	64.1	39.1	0.56	—0.28	.....	.....	...	s.	...	3	3	4	23
Fort Apache	5,050	25.08	+.03	30.18	30.37	30	29.88	21	0.48	44.1	+ 4.5	73.5	1	63.5	16.7	19	27.7	57	48	29	16	22	62.1	29.5	0.82	—0.18	3,295	e.	24	ne.	29	3	1	7	22
Fort McDowell	.....	.....	.....	.....	.....	...	.....	...	.....	58.7	.....	86.5	4	76.0	33.2	27	41.4	53.3	.....	...	.....	...	.....	.....	0.45	.....	.....	.....	.....	.....	...	2	...	...	...
Fort Craig	.....	.....	.....	.....	.....	...	.....	...	.....	42.0	.....	68.6	3	54.2	23.0	...	29.8	45.6	.....	...	.....	...	.....	.....	0.94	.....	.....	.....	.....	.....	...	3	...	...	...
San Carlos	.....	.....	.....	.....	.....	...	.....	...	.....	50.8	.....	79.0	4	64.9	26.0	...	36.6	53.0	.....	...	.....	...	.....	.....	0.55	.....	.....	.....	.....	.....	...	3	...	...	...
Fort Bowie	.....	.....	.....	.....	.....	...	.....	...	.....	53.5	.....	82.0	1	66.0	31.5	24	41	50.5	.....	...	.....	...	.....	.....	0.42	.....	.....	.....	.....	.....	...	4	...	...	...
Maricopa	.....	.....	.....	.....	.....	...	.....	...	.....	60.6	.....	87.0	5	76.9	33.0	30	44.2	54.0	.....	...	.....	...	.....	.....	0.20	.....	.....	.....	.....	.....	...	1	...	...	...
Willcox	.....	.....	.....	.....	.....	...	.....	...	.....	49.5	.....	83.0	1	71.5	18.5	20	28.5	64.5	.....	...	.....	...	.....	.....	0.25	.....	.....	.....	.....	.....	...	2	...	...	...
El Paso	3,764	26.34	+.02	30.19	30.50	6	29.83	21	0.67	51.5	+ 1.0	80.0	2	67.8	25.4	20	39.3	54.6	38.4	24	16.6	16	60.0	36.1	0.22	—0.32	1,609	e.	16	w.	22	3	2	10	18
Middle plateau.																																
Salt Lake City	4,348	25.76	+.03	30.35	30.62	30	29.94	21	0.68	42.1	+ 3.7	64.3	7	51.5	26.0	30	32.8	38.3	26.0	6	7.2	17	52.5	25.1	0.50	—1.07	2,422	nw.	15	nw.	1	3	2	9	19
Fort Thornburg	.....	.....	.....	.....	.....	...	.....	...	.....	37.6	.....	62.5	2	51.0	1.65	19	24.1	46.0	.....	...	.....	...	.....	.....	0.00	.....	.....	.....	.....	.....	...	0	...	...	...
Fort Bidwell	.....	.....	.....	.....	.....	...	.....	...	.....	34.5	.....	54.4	6	47.6	10.3	13	21.4	44.1	.....	...	.....	...	.....	.....	0.04	.....	.....	.....	.....	.....	...	2	...	...	...
Northern plateau.																																
Dayton	1,667	28.42	.....	30.21	30.48	29	29.95	21	0.53	40.0	+ 3.2	64.0	25	48.0	23.5	22	32.2	40	25	18	5	16	87.1	35.8	0.25	—2.30	2,213	sw.	24	sw.	26	8	10	10	10
Lewiston	780	29.39	.....	30.26	30.56	27	29.99	21	0.57	39.7	+ 2.1	63.0	4	49.4	23.5	30	33.2	39.5	24.1	12	6.6	16	82.9	34.7	0.36	—1.30	321	se.	27	nw.	26	5	6	11	13
Spokane Falls	19,105?	28.11	+.04	30.19	30.48	27	29.92	20	0.56	37.7	+ 2.4	56.2	6	46.0	18.0	22	32.1	38.2	19.7	6	8.2	28	84.3	33.3	0.59	—1.68	1,304	ne.	16	nw.	26	9	8	18	1
Cœur d'Alene	.....	.....	.....	.....	.....	...	.....	...	.....	38.1	.....	59.0	2	44.9	20.0	28	31.2	39.0	.....	...	.....	...	.....	.....	0.30	.....	.....	.....	.....	.....	...	7	...	...	...
Boisé City	2,750	27.35	.....	30.29	30.59	30	29.91	21	0.65	40.3	+ 2.8	62.3	6	51.3	23.7	23	32.2	38.6	26.1	6	7.8	16	74.0	32.0	0.12	—0.70	1,503	.....	13	nw.	26	1	2	12	16
Linkville	.....	.....	.....	.....	.....	...	.....	...	.....	42.3	.....	65.0	2	56.4	19.0	22	28.2	46.0	.....	...	.....	...	.....	.....	0.15	.....	.....	.....	.....	.....	...	1	...	...	...
Ashland	.....	.....	.....	.....	.....	...	.....	...	.....	44.6	.....	78.0	7	62.0	22.0	25	27.1	56.0	.....	...	.....	...	.....	.....	0.07	.....	.....	.....	.....	.....	...	6	...	...	...
Fort Spokane	.....	.....	.....	.....	.....	...	.....	...	.....	35.9	.....	54.0	6	44.0	13.0	22	27.9	41.0	.....	...	.....	...	.....	.....	0.19	.....	.....	.....	.....	.....	...	3	...	...	...
North Pacific coast region.																																
Olympia	36	30.06	—.06	30.10	30.40	26	29.84	6	0.57	47.0	+ 3.9	63.0	7	53.0	35.0	30	43.3	28.0	17.0	30	3.0	16	89.0	43.9	1.37	—6.63	569	s.	14	s.	24	12	17	11	2
Portland	67	30.02	—.10	30.09	30.58	26	29.85	9	0.54	46.7	+ 1.6	65.2	9	55.1	34.0	27	41.4	29	20	12	8	3	84.8	42.0	3.24	—4.13	2,082	s.	15	e.	12	15	10	9	11
Roseburg	.....	29.54	.....	.....	.....	...	.....	...	0.51	47.4	+ 3.8	69.7	4	58.0	29.8	30	41.2	39.9	25.1	30	6.7	8	86.5	43.9	0.79	—2.15	* 608	nw.	..	.....	...	10	3	15	3
Fort Canby	179	29.83	.....	30.03	30.33	26	29.76	6	0.57	50.9	.....	64.0	12	55.1	38.7	22	46.8	25.3	15.4	12	4.0	24	86.5	46.7	4.05	.....	8,648	e.	33	se.	23	15	6	9	15
Port Angeles	.....	.....	.....	.....	.....	...	.....	...	.....	44.3	.....	56.0	11	49.8	26.5	22	38.8	29.5	.....	...	.....	...	.....	.....	1.50	.....	.....	.....	.....	.....	...	13	...	...	...
Neah Bay	.....	.....	.....	.....	.....	...	.....	...	.....	45.?	.....	55.	...	.....	32	22	.....	26	.....	...	.....	...	.....	.....	9.10	.....	.....	.....	.....	.....	...	10	...	...	...
Tatoosh Island	.....	29.94	.....	30.04	30.40	26	29.73	6	0.67	48.4	.....	58.	11	53.1	39.5	22	45.9	18.5	12.3	14	3.8	7	88.7	45.1	6.80	.....	13,478	e.	46	.....	...	15	16	12	2
Pysht	.....	.....	.....	.....	.....	...	.....	...	.....	45.6	.....	57.0	11	49.9	27.0	22	41.2	30.0	.....	...	.....	...	.....	.....	5.31	.....	.....	.....	.....	.....	...	14	...	...	...
Middle Pacific coast region.																																
Cape Mendocino	637	29.37	.....	30.07	30.28	25	29.85	10	0.43	53.5	.....	67.8	5	59.8	43.0	...	48.6	24.8	16.1	30	3.8	14	81.5	47.7	0.40	.....	12,972	n.	68	se.	6	7	16	15	9
Red Bluff	332	29.74	—.03	30.11	30.30	24	29.80	20	0.51	54.7	+ 3.2	79.0	26	67.7	36.0	26	44.0	43	43	26	10	14	62.3	40.6	0.04	—2.46	2,993	n.	18	n.	...	1	3	3	24
Sacramento	65	30.01	—.07	30.08	30.27	24	29.79	20	0.48	55.3	+ 3.9	75.2	6	67.6	37.7	23	44.7	37.5	29.5	3	16.0	13	72.0	46.1	0.00	—1.34	2,317	n.	22	se.	12	0	2	6	22
San Francisco	60	30.02	—.05	30.09	30.29	24	29.81	20	0.48	56.5	+ 1.1	70.5	4	62.4	50.0	23	52.5	20	18	4	5	12	81.4	50.5	0.26	—2.44	4,091	nw.	24	w.	2	2	13	2	15
South Pacific coast region.																																
Los Angeles	371	29.66	—.03	30.06	30.18	24	29.86	20	0.32	59.6	+ 1.9	88.0	7	73.2	38.7	27	48.0	49	39	4	11	13	71.2	48.4	1.07	+0.12	3,103	w.	14	sw.	...	3	2	10	21
San Diego	67	29.94	—.04	30.01	30.14	23	29.78	21	0.36	58.6	+ 0.5	74.0	6	67.6	42.0	27	49.5	32.0	26.0	...	8.6	3	77.1	50.7	0.11	—0.59	3,234	w.	18	w.	6	3	2	13	15
Yuma	141	29.82	.....	29.97	30.15	24	29.70	21	0.45	63.4	.....	87.3	9	78.0	43.1	27	51.9	44.2	36.5	9	17.0	21	60.4	47.9	Inap.	.....	2,757	ne.	24	ne.	6	1	0	6	24

* Record for 28 days. † 126 miles.

Auroras were observed at Le Roy, New York, on the 20th; Winnipeg, Manitoba, on the 22d, 23d, 24th, 27th, 28th; Fort Bridger, Wyoming, 24th; Saint Vincent, Minnesota, 28th; Salina, Kansas, 30th.

THUNDER-STORMS.

Thunder-storms occurred in several states and territories during November as follows:

Arizona.—Fort Bowie, 9th; Fort Apache, 8th and 9th; Prescott and Fort McDowell, 8th.

Arkansas.—Fort Smith, 3d, 17th, 22d; Lead Hill, 3d, 22d.

Dakota.—Huron, 15th.

District of Columbia.—Washington City, 23d.

Florida.—Jacksonville, 19th, 27th, Key West, 3d, 4th, 5th, 7th, 13th, 18th, 19th, 20th, 28th; Sanford, 19th, 28th; Cedar Keys, 28th; Pensacola, 3d, 22d; Archer, 3d, 4th, 19th, 20th, 27th, 28th; Limona, 3d.

Georgia.—Savannah, 4th; Forsyth, 18th.

Illinois.—Chicago, 16th; Mattoon, 1st; Sycamore, 16th; Sandwich, 17th.

Indiana.—Logansport, Wabash and Fort Wyne, 16th.

Kansas.—Independence, 2d, 18th; Wellington, 15th; Maud, 3d, 15th.

Louisiana.—New Orleans, 22d; Grand Coteau, 13th, 22d.

Maryland.—Baltimore and Fallston, 23d.

Minnesota.—Chester, 1st.

Mississippi.—Vicksburg, 22d.

New Jersey.—Vineland and Moorestown, 23d.

New York.—Palermo, 4th.

North Carolina.—New River Inlet, 19th; Smithville, 23d; Hatteras, 13th, 16th; Kitty Hawk, 24th.

Pennsylvania.—Blooming Grove, Catawissa, and Dyberry, 23d.

South Carolina.—Aiken and Stateburg, 23d.

Tennessee.—Austin, 23d; Memphis, sheet lightning in the west at midnight of the 3-4th.

Texas.—Galveston, 11th, 12th, 17th, 22d, 27th; Indianola, 2d, 11th, 12th, 17th, 21st, 22d, 25th, 26th; Palestine, 11th, 17th, 21st, 25th; Brownsville, 1st, 11th, 12th, 17th, 22d; Fort Stockton, 21st, 22d, 27th; Fort Concho, 3d, 4th, 11th, 12th, 17th; El Paso, 9th, 10th; New Ulm, 11th, 12th, 17th, 22d; Cleburne, 3d, 17th, 22d.

Virginia.—Chincoteague, Fort Myer, Lynchburg, and Variety Mills, 23d.

West Virginia.—Helvetia, 23d.

Wisconsin.—La Crosse, 1st; Beloit and Sussex, 16th.

Wyoming.—Fort Bridger, 16th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various districts as follows:

New England.—13th, 16th, 17th, 18th, 25th, 27th, 29th.

Middle Atlantic states.—3d, 8th, 16th, 17th, 27th, 30th.

South Atlantic states.—3d, 5th, 18th, 22d, 23d.

Florida peninsula.—13th, 17th, 29th.

East Gulf states.—19th, 26th.

West Gulf states.—Little Rock, Arkansas, 11th.

Rio Grande valley.—21st, 24th, 25th, 27th.

Tennessee.—11th, 17th, 21st, 22d, 25th, 26th, 27th.

Ohio valley.—Sunman, Indiana, 22d.

Lower lake region.—1st, 3d, 22d.

Upper lake region.—3d, 7th, 13th, 15th, 19th.

Extreme northwest.—6th, 10th, 16th, 18th, 21st, 30th.

Upper Mississippi valley.—3d, 18th, 19th, 23d, 24th, 29th, 30th.

Missouri valley.—Vermilion, Dakota, 22d.

Middle slope.—14th, 16th, 20th, 23d, 26th.

Southern plateau.—El Paso, Texas, 12th, 13th.

Middle plateau.—2d, 3d, 6th, 9th, 13th, 14th, 15th.

Northern plateau.—3d, 20th, 22d, 27th.

North Pacific coast region.—Roseburg, Oregon, 12th.

Middle Pacific coast region.—1st to 4th, 6th, 8th, 10th, 11th, 14th, 17th, 18th, 19th.

LUNAR HALOS.

Lunar halos were observed in the various districts, as follows:

New England—1st, 2d, 3d, 22d, 25th, 27th, 29th, 30th.

Middle Atlantic states.—1st to 4th, 16th, 18th, 21st, 24th to 27th, 30th.

South Atlantic states.—1st to 4th, 24th, 25th, 27th, 28th, 29th.

Florida peninsula.—27th, 29th, 30th.

Eastern Gulf states.—1st, 5th, 30th.

Western Gulf states.—1st to 4th, 23d, 25th, 26th, 28th.

Rio Grande valley.—24th, 27th.

Tennessee.—25th, 26th, 29th.

Ohio valley.—1st, 2d, 21st, 22d, 25th, 26th, 27th, 29th, 30th.

Lower lake region.—1st, 3d, 21st, 23d, 27th, 30th.

Upper lake region.—1st, 2d, 4th, 7th, 26th to 30th.

Extreme northwest.—1st, 8th, 11th, 24th, 27th, 28th, 29th.

Upper Mississippi valley.—1st, 2d, 20th, 24th, 26th, 27th, 28th, 30th.

Missouri valley.—1st, 2d, 22d, 25th, 27th, 28th.

Northern slope.—2d, 5th, 28th, 30th.

Middle slope.—2d, 24th, 25th.

Southern plateau.—3d, 25th, 26th, 28th.

Middle plateau.—1st, 2d, 6th, 8th, 23d, 28th.

Northern plateau.—7th, 23d, 27th.

North Pacific coast region.—1st, 4th, 6th, 7th, 23d, 25th, 27th.

Middle Pacific coast region.—1st, 4th, 6th, 7th, 23d, 25th, 27th.

The phases of the moon during the month were: full moon, 3d, 3.30 a. m.; last quarter, 9th, 6.06 p. m.; new moon, 17th, 1.05 p. m.; first quarter, 25th, 5.09 p. m., perigee, 4th, 11 a. m.; apogee, 19th, 9 p. m.

MIRAGE.

Allison, Decatur county, Kansas: a remarkable mirage was observed at Kenneth, in the adjoining county (Sheridan), on the 18th. It appeared a short time after sunrise, showing plainly portions of the country ordinarily beyond the range of vision. The divide north of the North Solomon river, fifteen miles distant, was plainly visible. The bluffs south of Hackberry Creek and also those south of Smoky Hill river, from twenty-five to fifty miles distant, were plainly discernible, and appeared as though suspended in the sky.

Bismarck, Dakota: on the morning of the 13th Fort Yates and Standing Rock, situated sixty-five miles south of Bismarck, were plainly visible. The surroundings of these places, which are separated from Bismarck by a range of high hills, were brought fully into view. The mirage was first observed at 7 a. m., and continued until 8.30.

Webster, Day county, Dakota: mirage was observed on the 5th, 7th, 12th, and 13th; that on the last-named date being especially beautiful. The town of Bristol, and a railway train moving eastward, were plainly visible. Bristol is eleven miles west of Webster. The limit of vision was greatly extended in all directions; and to the southward houses appeared in inverted positions.

New London, Connecticut: a well-marked mirage was visible during the afternoon of the 3d, points of land below the horizon being visible 15° above the sea line.

Galveston, Texas: on the 30th, at 3 p. m., a very perfect mirage was observed. Bolivar City, over five miles distant, appeared so near that the doors and windows of the houses were plainly visible.

Northport, Michigan, 20th: a mirage was observed at 1.45 p. m. in the east, and continued until 2.25.

Mirage was also observed at the following stations:

Salina, Kansas, 7th, 14th.

Genoa, Nebraska, 8th, 10th, 11th.

Indianola, Texas, 18th, 19th, 23d.

The following extract is from the "Los Angeles (California) Herald," of October 23d, 1884:

Just before the rain of Sunday, October 12th, when the clouds hung low on the Sierra Madre, and the air was heavily charged with vapor, there was a rare sight in Crescent, Canada. The Sierras were hidden from view, and

the upper side of La Canada, by the reflection of the light, seemed lifted up about six thousand feet, occupying the topmost height of the mountains. The ranch of Colonel T. S Hall was most conspicuously exalted. His eucalyptus trees appeared to be in the very skies, while his neighbors along the upper mesa were also elevated to a strange, weird and fantastic height. The spectacle continued for nearly two hours, when it slowly faded away, and the landscape settled down again apparently about six thousand feet to its normal condition. The sight was rare, and of absorbing interest to all who beheld it. It is not often that the refraction of light is so intense in its manifestation as in this case, and the occasion is deserving of more than a passing notice. In a horizontal distance of two and one half miles, there was a manifested elevation of more than a mile. To one familiar with the features of the country the sight was especially interesting.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-two stations show 4,828 observations to have been made, of which one was reported doubtful; of the remainder, 4,827, there were 4,317, or 89.4 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for November, 1884:

Date—Nov., 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
3, 2 p. m.	.....	.....	.....	.....	.....	.....	1	5	
3, 4 p. m.	0	0	0	0	0	0	1	5	
5, 10 a. m.	0	0	0	0	0	0	1	2	
6, 9 a. m.	0	0	0	0	0	0	1	1	
7, 2 p. m.	0	0	1	1	0	0	0	0	
8, 9 a. m.	0	0	0	0	0	0	0	0	
9, 1 p. m.	1	5	0	0	0	0	1	5	
9, 4 p. m.	1	1	0	0	0	0	2	6	
10, 1 p. m.	2	15‡	0	0	0	0	4	20‡	
12, 4 p. m.	3	5‡	1	2	.....	.....	6	25‡	Spots mostly small.
13, 9 a. m.	0	0	0	0	0	0	6	25‡	Do.
14, 3 p. m.	0	0	0	0	0	0	5	25‡	Do.
18, 1 p. m.	0	0	.....	.....	.....	.....	2	5	
21, 11 a. m.	2	30‡	.....	.....	.....	.....	3	35‡	
22, 10 a. m.	0	0	0	0	0	0	3	35‡	
24, 10 a. m.	0	0	0	0	0	0	3	25‡	
25, 9 a. m.	2	5	0	5‡	1	2	5	25‡	
27, 1 p. m.	.....	.....	.....	.....	.....	.....	2	20‡	
29, 3 p. m.	1	5‡	0	0	0	0	3	25‡	
30, 10 a. m.	0	0	0	0	0	0	3	25‡	

Faculæ were seen at the time of every observation. ‡Approximated.

Mr. William Dawson, at Spiceland, Henry county, Indiana, reports sun spots as follows:

Date.	No. of groups.	No. of spots.	Remarks.
1884.			
November 6	1	1	Near west edge.
7	1	1	1′ from west edge.
8	0	0	
9—9 a. m.	2	10	Nine spots near centre.
9—2.30 p. m.	3	25	Spots increasing rapidly.
10	4	33	
11	7	47	
12	6	40	
13	7	43	
14	5	50	
15	6	28	
16	6	10	
19	3	28	
21	4	61	Five spots quite large.

NOTE.—Telescope, 4.6 inches aperture; power, 160; prism eyepiece; full aperture used.

SUN GLOWS.

The following communication referring to the first appearance of these phenomena in November, 1883, has been received from Mr. Willard D. Johnson of the United States Geological Survey:

WASHINGTON, D. C., December 9, 1884.

Prof. CLEVELAND ABBE, *U. S. Signal Service, Washington, D. C.*

DEAR SIR: The phenomena of the red skies first attracted my attention on November 24, 1883, near Mono Lake, California. A heavy wind had been blowing across the Sierras from the west since the previous evening; as the air was apparently clear the day seemed unaccountably gray and the fiery sunset, and widespread, persistent after-glow excited comment in my party as a remarkable and impressive exhibition. Sunrise on the following morning was preceded by a yet deeper and higher-reaching color in which a shade of green was prominent. The appearance of this sky was peculiarly unnatural, my cook describing it as "sickly," and declaring that it destroyed his appetite. During the day, although the sky remained cloudless, the sun's light was very sensibly diminished; its disk variously tinted with alternating shades of red, yellow and green, and its outline traceable to the naked eye.

For a week at least, the striking exhibitions showed no abatement. When we finally learned that they were not of local occurrence, and were of general interest, we could not remember that we had observed any unusual appearance of the skies previous to the above date.

Very respectfully,

WILLARD D. JOHNSON.

The sun glows were as extensively observed during November, 1884, as in the preceding months, being reported generally from all parts of the country. The displays equalled in brilliancy those heretofore observed, and in some instances are said to have surpassed those of last year.

Mr. C. Beecher, voluntary observer at Newport, Florida, reported: "on the 18th and 25th a brilliant red sky before sunrise—more splendid than anything last year—it seemed as though an immense conflagration were raging. It extended half way around the horizon and was reflected on the opposite side."

DROUGHT.

Alabama.—Professor P. H. Mell, jr., director of the Alabama State Weather Service, reports the following:

The autumn of 1884 was remarkable for the longest and most severe drought ever recorded by the meteorologists of the state. Beginning immediately after the violent rains of the last week in July, it continued through August, September, October and November, broken only by a few showers. The drought was aggravated by the unusually high temperature of September and the first week of October. This combination of heat and drought reduced the streams, wells and springs, and reports of the dearth of water came from all quarters of the state, except along the coast, where the precipitation was nearly normal. In many sections cattle were fed as in the winter; pastures and all late crops were much injured; the sowing of grain was greatly retarded; the amount of cotton made was reduced, but most of the crop was gathered before any rain fell upon it, and it is in excellent condition for the market.

Florida.—Cedar Keys, 3d: the weather continues very dry; cisterns exhausted and water for drinking and household purposes very scarce; 13th, drought still continues.

New Hampshire.—The "New York Herald" of November 20th published the following:

CONTOOCOOK, *November* 19.—The effects of the drought are seriously felt in many portions of this state. In some localities sickness, due wholly or in part to the use of water from low wells, has occurred and seems to be increasing.

The following is from the "New York Journal of Commerce," of November 24th:

NASHUA, *November* 22.—The drought has become a very serious matter in this vicinity and is a cause of general alarm in its consequences upon the health of the people. In many of the suburban towns wells and springs have given out, farmers have to drive their live-stock long distances for water, and are also greatly troubled in obtaining water for household purposes. In this city the sewerage is affected, and the scarlet fever, from which there has been a great many deaths, is raging to such an extent that at a meeting of the Board of Education last night it was voted to close the public schools.

New Jersey.—Vineland, Cumberland county, 30th: the weather continued very dry during the month; wells very low.

North Carolina.—Kelley's (near Raleigh), 30th: the severest drought that has been experienced for many years prevailed from September 11th to November 19th; the streams and wells became nearly dry.

Tennessee.—Nashville, 26th: drought prevails throughout the state; since the 1st only 0.88 inch of rain has fallen.

Virginia.—Wytheville: the long continued drought was ended by the rains of the 23d.

The following extracts are from the "New York Herald" of November 17th and 20th, respectively:

PETERSBURG, *November* 16, 1884.—The drought of the past few months remains unbroken. In some of the upper counties springs and streams are still drying up. The drought is a great drawback to farmers, who, in consequence of the dry and hard condition of the ground, are unable to plough their lands. For more than a month the water in the city reservoirs has been so low, that only one-half of the citizens have been supplied from that source, the other half being furnished from the river.

LYNCHBURG, VA., *November* 19, 1884.—A tale of deep distress comes from Buchanan, Wise and Dickenson counties. These counties occupy isolated positions on the extreme western limit of Virginia. For a number of weeks a fatal disease has been prevalent there, and many deaths have occurred. The nature of the disease is as yet undefined, but it is believed to arise from poisonous water. A drought that has continued there for months has nearly dried up all the streams, springs and wells, and it is supposed that the water left is impregnated with mineral poisons. A reliable correspondent writing from there, tells a pitiful story, and says that in some cases as many as four corpses were found in a single house.

West Virginia.—Charleston, 21st: reports from the extreme southwestern counties of Virginia and the adjoining counties in Kentucky, state that no rains of consequence have fallen in that region for four months, which resulted in an almost entire failure of crops, and an insufficient water supply. In some localities inconvenience from this cause was experienced as early as the middle of August. The continued scarcity of water compelled the inhabitants to use, for drinking, the water in the beds of creeks. The use of this impure water is supposed to have caused a peculiar and fatal disease. It is reported that in some instances, especially along McLean Creek, entire families perished. The drying up of the streams also caused the suspension of work in all the mills that were dependent on water power.

EARTHQUAKES.

November 4th.—Ship "Occidental," at San Francisco, November 14th, from Nanaimo, reported that at 6 p. m. on November 4th, one hundred and fifty miles off Mendocino, she experienced three shocks of earthquake, and, a few hours later, two heavier shocks were felt.

6th.—The "New York Herald," of November 8th, has the following:

BUENAVENTURA, *via.* GALVESTON, *November* 7, 1884.—News from Cali and other towns in the southern states of Colombia, reports that the most severe shock of earthquake that has been experienced for three years was felt last night. The church of the San Pedro, at Cali, was wrecked and another church and several houses suffered severely. The other towns which felt the shock escaped without serious injury.

9th.—Fort Bridger, Wyoming: at about 2.00 a. m. of this date, an earthquake shock was felt at this station, causing windows to shake and alarming the garrison. The Signal Service observer reported: "Telegraph poles shook and the wires swung perceptibly; the shock lasted from five to ten seconds, and, as nearly as I can estimate, moved from west to east."

10th.—The "Kansas City Review of Science" publishes the following: "A severe shock of earthquake was felt at Salt Lake City, Utah, at about two o'clock on the morning of the 10th. Much alarm was felt but no damage was done. The tremors lasted about ten seconds. At Paris, Idaho, six shocks were felt about the same time, and from then till four oclock. Considerable damage to houses is reported and the people were affected as by sea-sickness. The shocks were from northeast to southwest, then a swaying motion from north to south; the succeeding shocks were from east to west.

12th.—Professor C. G. Rockwood, jr., of Princeton, New Jersey, reports: "About 7.50 p. m. a slight earthquake occurred in southern New Hampshire, reported from Concord, Hopkinton, Bradford, and Warner, in Merrimac county and Hillsborough, in Hillsborough county."

13th.—An earthquake shock was felt in Colchester and Kingsville, in Essex county, Ontario, at about 10 a. m. At the latter place, the glass in a few windows was broken.

21st.—Several places, both on the north and south shores of the river Saint Lawrence, extending from Saint Flavie to Gaspe, a distance of one hundred and fifty miles, were visited by a shock of earthquake during the evening. The shock lasted in some places for fifty seconds, and although not heavy enough to do any serious damage, greatly alarmed the settlers along its track.

22d.—The "New York Herald," of November 23d, publishes the following:

LIMA, via GALVESTON, *November* 22, 1884.—A strong shock of earthquake was felt here at thirteen minutes past seven o'clock this morning. Its motion was from southwest to northeast. There was no unusual electric disturbance. Clouds of dust were visible from three to five miles from Callao, where portions of the cliff were shaken down on the beach. The walls of many houses were cracked and some were shaken down. In Chorillos there is a series of cracks nine yards from the edge of the cliff.

23d.—The "New York Herald," of November 24th, contains the following:

CONCORD, N. H., *November* 23, 1884.—A slight shock of earthquake was felt here at half-past twelve this morning, followed sixteen minutes later by a very heavy one, lasting several seconds, during which large buildings were shaken. The second shock was accompanied by a heavy rumbling noise, which was sufficiently loud to awaken people from their slumbers. The shocks were also felt in various parts of the state.

CONTOOCOOK, *November* 24, 1884.—A shock of earthquake was felt at Henniker yesterday morning, so severe as to displace the foundation of the boiler in Gage's manufactory. The shock was extensively felt in this part of New Hampshire.

BOSTON, Mass, *November* 24, 1884.—The earthquake shock reported from various points in New Hampshire as having occurred early yesterday morning was felt in this vicinity also. A gentleman living in Cliftondale states that he noticed it very perceptibly, and noted the time, which was forty minutes past twelve a. m.

NEW IPSWICH, N. H., *November* 24, 1884.—An earthquake shock was distinctly felt here yesterday morning by many persons.

WORCESTER, Mass., *November* 24, 1884.—The earthquake shock yesterday morning was plainly felt in Holden, six miles north of here.

The following is a synopsis of the information collected by Sergeant D. F. Flannery, Signal Service Observer at Memphis, Tennessee, concerning the earthquake shock felt in that city on the night of the 29th:

Names.	Buildings.	Time.	Waves.	Direction.	By whom felt.	Effects.
W. S. Anderson	Four story, substantial brick, 223 2d street.	Not given	Two: 1st, severe; duration, instant; interval, two seconds. 2d wave lighter than the first one.	w. to e.	Writer	Interrupted his writing; motion like small boat on water.
R. W. Tucker	Frame, 2 to 5 feet on pillars above ground, 2 A Broadway.	10.55 p. m.	One severe shock, lasting several seconds.	w. to e.	Mrs. R. W. Tucker and Miss Florence Tucker.	Furniture creaked.
Mrs. M. E. Carter..	Frame, 3 feet above ground, 302 Lauderdale street.	11.00 p.m.	Two shocks, duration, 10 to 12 seconds, swinging motion.	w. to e.	Writer	Bed, windows, and house shook
Dr. De Benanceney.	Two story, clay foundation, 181 Maine st.	11.15 p.m.	One shock, duration, 10 seconds.		Writer	House rocked
A. L. Cummins.....	Two story brick, 55 Poplar st.	11.02 p.m.	One severe shock, with heavy rumbling noise, duration, 30 to 40 seconds.	ne. to sw.	Writer	House rocked
Col. Edginton	Two story brick, 122 Jones Avenue.	11.00 p.m.	One severe shock, lasted 3 to 4 seconds.	sw. to ne.	Writer	House and bed shook.
Article "Appeal," signed J. M. H.	.....	11.03 p.m.	A noise like wind preceded the wave; lasted 60 seconds.	s. to n.	Writer	Windows rattled; chairs swayed.

Hartford, Connecticut: at 12.30 a. m. on the 23d, a perceptible tremor was felt by the employees in the top story of the "Courant" building. As a strong wind was blowing at that time the motion was attributed to that, until reports from other points stated that an earthquake had occurred. At

Mansfield, forty miles distant, several very distant shocks were felt at about 12.45 a. m. There were seven or eight shocks which came in rapid succession, so rapidly that they were not accurately counted. The first shock appeared to have been the lightest, and the succeeding shocks increased in intensity, the last being the heaviest.

27th.—Geneva, Switzerland, several shocks of earthquake were felt here at 11 p. m.

28th.—Slight earthquake shocks were felt yesterday at Rome; at Marseilles, at Lyons, and in the department of the Maritime Alps.

29th.—The following is from the Report of the Tennessee Weather Service for November, 1884:

Mr. Louis Hughes, observer at Dyersburg, reports a slight shock of earthquake as follows: "On the 29th, at 11.5 p. m., rumbling noise southwest; vibrations medium; house trembled; did not disturb those asleep; direction of vibrations from southwest to northeast; vibrations lasted about five seconds; a feeble second shock was felt after an interval of about a minute and a half."

Dr. T. W. Roane, observer at Covington, reports that on the night of the 29th, about 10 o'clock, the shock of an earthquake (though not a very hard one) was quite easily felt and heard, lasting about a minute.

PRAIRIE AND FOREST FIRES.

Brevard, Transylvania county, North Carolina: from the 11th to the 17th the air was filled with dense smoke from forest fires; during the 15th and 16th the smoke was so dense that the sun cast no shadows.

Highlands, Macon county, North Carolina: the atmosphere was very smoky from the 11th to the 17th, being caused by forest fires.

Reports from Norfolk, Virginia, on the 11th stated that fires had broken out in the Dismal Swamp, destroying trees and telegraph poles.

Petersburg, Virginia: reports from Greenville county state that on the 19th considerable quantities of timber and fencing, and some houses were destroyed by forest fires near the town of Hicksford. In consequence of the protracted drought the grass and undergrowth were so dry as to burn easily.

Fort Maginnis, Montana: extensive forest fires prevailed in the mountains southeast of the station on the 14th and 19th.

Sherlock, Finney county, Kansas: on the morning of the 14th the prairie took fire at a point about six miles southeast of this place; the fire started at 9 a. m., at which time a strong southwest wind was blowing, which caused the flames to travel with great rapidity. The "side fires" were fought by herdsmen and in some places they were extinguished but the "head fire" continued during the day and also on the 15th, travelling northward. During the latter date the wind changed to northwest and north, and the fires apparently died out. On the 16th the wind changed to east, bringing from the burnt district dense clouds of smoke, which obscured the sun and shut from view the surrounding country. At night the wind backed to northeast and the fire continued to spread westward and southward, menacing the settlements along the Arkansas river. The fires were extinguished by the snow-storm on the 17th, on which date the reports from various points showed that the fires had swept over a strip of country about seventy miles long and averaging thirty miles in width. The area burned over embraced about 1,500,000 acres, situated mainly in the counties of Hamilton, Finney, Hodgeman, and Lane. In the last-named county the damage was especially heavy.

Prairie and forest fires were also reported from the following places:

Lead Hill, Arkansas, 27th, 28th, 29th.
Allison, Kansas, in e. and sw. on the 1st.
Maud, Kansas, 3d to 7th.
Saint Vincent, Minnesota, 12th, 15th, 16th.
Fort Yates, Dakota, 6th.
Yankton, Dakota, 17th, 19th, 30th.
Fort Assinaboine, Montana, 7th.
Cantonment, Indian Territory, 19th.
Pike's Peak, Colorado, prairie fires southeast of station on the 24th.

METEORS.

Meteors were observed during the month as follows:

Arkansas.—Lead Hill, 4th.
Connecticut.—New London, 5th.
Dakota.—Webster, 23d.
Florida.—Archer, 10th.
Illinois.—Anna, 13th.
Indiana.—Vevay, 7th, 11th, 12th.
Iowa.—Davenport, 10th; Cedar Rapids, 7th, 9th, 10th, 12th.
Kansas.—Clay Center, 8th, 9th, 11th, 14th, 18th, 29th, 25th; Salina, 7th, 9th, 14th; Sherlock, 5th, 10th, 13th; at Allison meteors were observed as follows: twenty-six from 6.40 to 8.30 p. m. on the 6th; twenty-nine from 5.45 to 8.38 p. m. on the 7th; twenty-six from 6 to 8.55 p. m. on the 8th; twenty-eight from 5.55 to 8.40 p. m. on the 9th; thirty from 6.15 to 8.27 p. m. on the 10th; nineteen from 6.10 to 7.35 p. m. on the 11th; thirty-one from 6.20 to 8.55 p. m. on the 12th; twenty-five from 6.05 to 8.10 p. m. on the 13th; six from 5.50 to 7 p. m. on the 14th.
Kentucky.—Richmond, 9th, 13th.
Maryland.—Woodstock, 5th, 12th, 13th, 15th, 16th, 17th.
Massachusetts.—Somerset, 11th, 16th.
Michigan.—Thornville and Grand Haven, 15th.
Nebraska.—Yutan, 14th; Crete, 23d.
New Jersey.—Readington, 6th, 15th.
New York.—Le Roy, 9th; Menand Station (near Albany), 14th, 15th; Oswego, 14th, 15th, 16th.
North Carolina.—Kelley's (near Raleigh), 6th, 7th, 8th.
Ohio.—Hiram, 14th, 18th.
Oregon.—Albany, 14th.
Pennsylvania.—Fallsington, 15th.
Rhode Island.—Block Island, 2d.
South Carolina.—Stateburg, 8th, 24th.
Texas.—Indianola, 13th.
Utah.—Nephi, 27th.
Virginia.—Wytheville, 1st, 13th; Variety Mills, 5th, 10th, 11th, 29th; Blacksburg, 8th; Dale Enterprise, 24th.
Washington Territory.—Dayton, 7th.
Wisconsin.—Beloit, 20th, 21st; Sussex, 27th; Madison, 7th, 13th.

MIGRATION OF BIRDS.

Geese flying southward.—Fort Smith, Arkansas, 9th; Roseburg, Oregon, 11th; Bismarck, Dakota, 12th; Archer, Florida, 1st, 8th; Cœur d'Alene, Idaho, 21st; Edgington, Illinois, 8th; Indianola, Iowa, 19th; Independence, Kansas, 18th, 19th, 25th; Salina, Kansas, 11th, 12th, 13th; Allison, Kansas, 9th, 10th, 19th, 20th, 22d, 23d; Thatcher's Island, Massachusetts, 19th; Yutan, Nebraska, 4th, 29th; North Volney, New York, 3d; Palermo, New York, 13th, 14th; New River Inlet, North Carolina, 4th; Toledo, Ohio, 3d; Portland, Oregon, 7th; Point Judith, Rhode Island, 8th to 11th, 16th, 18th, 19th, 20th; Memphis, Tennessee, 6th, 23d; Fort Myer, Virginia, 3d, 5th; Cape Henry, Virginia, 4th; Embarras, Wisconsin, 1st.

Ducks flying southward.—Indianola, Iowa, 12th; Allison, Kansas, 22d; Yutan, Nebraska, 1st, 26th; Kitty Hawk, North Carolina, 3d; Memphis, Tennessee, 3d; Cape Henry, Virginia, 4th; Fort Myer, Virginia, 28th.

Cranes flying southward.—Indianola, Iowa, 14th, 16th.

POLAR BANDS.

Lead Hill, Arkansas, 9th, 13th, 16th.
Archer, Florida, 2d, 3d, 5th, 6th, 13th, 14th, 21st, 24th, 29th,
Riley, Illinois, 17th.
Laconia, Indiana, 27th.
Guttenberg, Iowa, 8th, 13th, 15th.
Yates Centre, Kansas, 25th.
Salina, Kansas, 7th.
Maud, Kansas, 24th.
Point Pleasant, Lousiana, 23d.
Gardiner, Maine, 1st, 30th.
Yutan, Nebraska, 2d.

Meteorological record of voluntary observers and army post surgeons—November, 1884.

Station.	Temperature Mean.	Maximum.	Minimum.	Rainfall.
Orono, Me	37.1	58	9	3.99
Cornish, Me	34.2	57	16	3.00
Gardiner, Me	36.0	57	16	3.29
Antrim, N. H	.....	.....	.....	3.35
Weir's Bridge, N. H	.....	.....	.....	3.14
Lake Village, N. H	.....	.....	.....	3.52
Bristol, N. H	.....	.....	.....	2.98
Ashland, N. H	.....	.....	.....	3.76
Woodstock, N. H	.....	.....	.....	4.35
Belmont, N. H	.....	.....	.....	4.01
Wolfborough, N. H	.....	.....	.....	3.47
Charlotte, Vt	34.8	58	10	4.00
Burlington, Vt	36.1	57	17	2.95
Woodstock, Vt	32.7	57	10	4.35
Dorset, Vt	35.1	59	16	4.73
Lunenburg, Vt	30.6	50	10	1.90
Newport, Vt	33.4	54	9	4.16
Strafford, Vt	33.1	54	14	4.40
Amherst, Mass	38.7	61	20	2.53
Williamstown, Mass	36.0	51	21	2.09
Dudley, Mass	.....	.....	.....	2.14
Mendon, Mass	38.8	64	8	1.10
Milton, Mass	39.1	63	19	3.43
New Bedford, Mass	40.9	57	22	3.49
Somerset, Mass	41.2	64	18	3.40
Princeton, Mass	35.3	54	14	5.29
Westborough, Mass	39.4	66	16	2.95
Taunton, Mass	41.4	65	18	3.63
Rowe, Mass	34.5	56	14	3.70
Worcester, Mass	37.6	62	18	2.27
Providence, R. I	42.9	67	19	3.50
Nyatt Point, R. I	.....	62	20	7.68
Hartford, Conn	38.7	64	18	2.78
Southington, Conn	36.8	62	17	2.35
North Colebrook, Conn	34.9	58	11	3.99
Bethel, Conn	.....	.....	.....	3.95
Voluntown, Conn	.....	64	18	3.10
Fort Hamilton, N. Y	43.8	62	21	3.01
Mountainville, N. Y	36.5	63	17	4.14
Palermo, N. Y	33.6	57	15	2.18
Auburn, N. Y	38.7	63	20	2.05
Humphrey, N. Y	35.1	58	10	2.93
Menand, N. Y	36.5	59	20	3.38
Ithaca, N. Y	37.5	60	15	1.74
Le Roy, N. Y	40.1	68	16	1.92
Penn Yan, N. Y	.....	.....	.....	1.09
Cooperstown, N. Y	36.0	60	18	2.86
North Volney, N. Y	35.9	56	17	2.40
Port Jervis, N. Y	36.7	56	16	3.39
Factoryville, N. Y	35.9	58	14	1.41
White Plains, N. Y	43.1	65	16	3.32
Fort Niagara, N. Y	37.4	62	13	0.77
Fort Columbus, N. Y	43.3	63	19	3.02
West Point, N. Y	41.0	64	18	5.00
Madison Barracks, N. Y	36.1	59	4	2.49
Plattsburg Barracks, N.Y.	34.5	58	8	2.03
David's Island, N. Y	44.5	65	21	2.60
Phillipsburg, N. J	.....	60	22	2.72
Somerville, N. J	40.0	62	20	5.85
Readington, N. J	45.7	74	24	4.30
Vineland, N. J	43.2	67	16	2.81
Moorestown, N. J	41.2	64	17	3.40
South Orange, N. J	41.0	67	20	3.30
Salem, N. J	.....	70	26	3.15
Wellsborough, Pa	39.0	62	26	6.61
Fallsington, Pa	40.6	62	20	3.12
Leetsdale, Pa	37.2	70	14	1.43
Grampian Hills, Pa	35.7	60	10	1.82
Drifton, Pa	37.8	68	14	3.83
Wilkesbarre, Pa	38.4	64	16	3.30
Troy, Pa	35.0	59	13	2.03
Easton (Lafayette Col.), Pa	42.3	62	30	.....
Dyberry, Pa	35.2	58	17	2.48
Blooming Grove, Pa	38.9	62	17	3.00
Catawissa, Pa	40.8	64	17	2.98
Westchester, Pa	41.2	68	17	4.36
Easton, Pa	.....	.....	.....	3.26
Quakertown, Pa	40.0	60	17	3.53
Altoona, Pa	44.4	62	22	0.77
Tamaqua, Pa	40.0	60	20	2.90
Chambersburg, Pa	36.1	64	17	1.51
Franklin, Pa	32.5	61	12	1.77
Haverford College, Pa	.....	62	18	3.48
State College, Pa	.....	64	12	1.66
Cumberland, Md	41.9	64	24	0.92
McDonogh School, Md	41.4	67	20	3.86
Emmitsburg, Md	42.5	65	24	3.08
Woodstock, Md	41.8	67	17	4.27
Fallston, Md	42.9	67	22	3.14
Great Falls, Md	43.9	70	24	3.41
Fort McHenry, Md	44.0	71	23	3.91
Dale Enterprise, Va	41.3	70	20	2.86
Wytheville, Va	42.7	67	20	1.21
Variety Mills, Va	42.4	72	19	2.24
Accotink, Va	45.1	74	23	2.61
Blacksburg, Va	44.9	69	20	1.00
Fort Monroe, Va	51.5	73	30	0.58
Snowville, Va	.....	61	30	.....
Marion, Va	42.7	66	20	0.44
Summit, Va	43.2	74	18	.....
Johnsonton, Va	52.0	78	29	0.90
Kelleys, N. C	51.0	77	26	3.10
Asheville	46.0	70	23	1.10
Lenoir, N. C	.....	68	23	1.00
Brevard, N. C	43.3	67	20	4.05
Lincolnton, N. C	.....	45	36	2.61
Highland	36.6	62	19	4.54
Flat Rock, N. C	45.6	65	22	0.05
Statesville, N. C	50.1	68	26	1.71
Weldon, N. C	46.9	76	24	1.30
Chapel Hill, N. C	50.9	79	26	.....
Stateburg, S. C	51.0	72	30	1.18
Aiken	53.7	75	32	1.91
Milledgeville, Ga	52.7	76	26	1.54
Forsyth, Ga	36.3	76	30	3.80
Athens, Ga	49.1	70	24	3.76
Quitman, Ga	.....	80	35	2.00
Manatee, Fla	71.2	86	50	1.46
Archer, Fla	62.0	82	31	3.80
Mayport, Fla	65.8	77	48	3.78
Tallahassee, Fla	56.0	78	34	.....
Limona, Fla	70.8	85	41	1.45
Saint Augustine, Fla	63.8	77	40	3.87
Green Springs, Ala	49.8	74	29	2.02
Mt. Vernon B'ks, Ala	57.2	78	27	4.73
Birmingham, Ala	.....	79	20	.....
Point Pleasant, La	52.0	70	32	7.99
Liberty Hill, La	.....	74	31	.....
Luling, La	55.2	78	33	4.91
Grand Coteau, La	57.3	76	34	3.57
Cleburne, Tex	51.1	80	24	3.00
Fort Brown	66.4	81	47	1.18
New Ulm, Tex	57.9	80	30	4.99
Clarksville, Tex	54.4	76	28	2.60
Fort Concho, Tex	55.0	80	28	1.50
Austin, Tex	58.0	77	36	3.40
Mount Ida, Ark	49.0	70	18	2.55
Lead Hill, Ark	47.4	86	16	4.71
Wellsburg, W. Va	.....	.....	.....	0.60
Helvetia, W. Va	40.1	67	20	2.66
Milan, Tenn	45.5	75	21	1.61
Austin, Tenn	46.1	70	26	1.77
Ashwood, Tenn	48.0	72	24	1.70
Greenville, Tenn	46.0	68	28	0.30
Maryville, Tenn	46.0	70	29	1.12
Andersonville, Tenn	45.0	69	22	0.75
Careyville, Tenn	43.0	66	20	1.82
Parksville, Tenn	47.0	70	25	1.70
Sunbright, Tenn	40.0	70	17	0.30
Grief, Tenn	43.0	71	20	1.67
Farmingdale, Tenn	.....	.....	.....	1.03
Fostoria, Tenn	44.0	70	24	2.05
Grassy Cove	40.0	65	21	1.08
Cookeville, Tenn	.....	.....	.....	1.53
McMinnville, Tenn	42.0	70	18	1.95
Manchester, Tenn	41.0	70	20	1.95
Biddleton, Tenn	45.0	76	21	1.45
Beech Grove, Tenn	.....	76	22	1.55
Flat Rock, Tenn	45.0	09	24	1.42
Florence Station, Tenn	48.0	70	29	1.49
Howell, Tenn	45.0	76	25	1.01
Hardison's Mills, Tenn	44.0	72	22	1.64
Barren Plains, Tenn	45.0	70	20	1.10
Hurricane Switch, Tenn	41.0	74	21	1.78
Dickson, Tenn	.....	.....	.....	1.44
Sailors Rest, Tenn	45.0	.....	20	1.27
Hohenwald, Tenn	46.0	73	19	1.49
Waynesboro, Tenn	47.0	75	20	1.58
Savannah, Tenn	46.0	72	23	0.79
McKenzie, Tenn	47.0	68	23	1.48
Henderson, Tenn	.....	.....	.....	1.86
Dresden, Tenn	44.0	74	22	1.50
Milan, Tenn	45.0	75	21	1.61
Trenton, Tenn	44.0	68	22	1.93
Bolivar, Tenn	46.0	71	24	1.35
Dyersburg, Tenn	44.0	71	20	2.13
Somerville, Tenn	47.0	73	23	1.44
Covington, Tenn	46.0	73	24	1.39
Richmond, Ky	44.0	64	17	1.58
Bowling Green, Ky	42.7	68	18	1.99
Ruggles, Ohio	37.3	60	12	0.85
Cincinnati, Ohio	43.7	66	15	1.08
Quaker City, Ohio	40.9	64	11	1.64
Hiram, Ohio	36.9	60	10	2.17
New Athens, Ohio	39.0	64	16	1.37
Canton, Ohio	37.3	62	13	1.12
Cleveland, Ohio	39.3	64	16	2.02
Westerville, Ohio	38.2	64	12	1.08
North Lewisburg, Ohio	39.4	64	11	0.85
Warren, Ohio	37.2	62	13	1.52
College Hill, Ohio	41.3	64	10	1.07
Wooster, Ohio	38.1	64	11	0.98
Wauseon, Ohio	35.5	63	4.7	1.46
Portsmouth, Ohio	42.4	70	20	1.46
Garrettsville, Ohio	37.7	68	14	1.03
Oberlin, Ohio	37.3	64	12	0.93
Dayton, Ohio	39.9	63	10	0.75
New Bremen, Ohio	40.1	60	10	2.78
Sidney, Ohio	37.5	64	9	1.73
Junction, Ohio	34.8	62	8	1.52
Levering, Ohio	36.1	63	10	1.44
Gambier, Ohio	.....	57	11	2.01
Ironton, Ohio	44.6	78	14	1.55
Washington C. H., Ohio	38.8	65	13	0.68
Waverly, Ohio	40.3	67	17	1.87
Westerville, Ohio	38.0	64	.....	1.08
Logan, Ohio	41.6	69	14	1.52
Marietta, Ohio	41.3	65	20	1.87
McConnelsville, Ohio	38.6	67	17	1.89
Pomeroy, Ohio	42.1	66	18	1.90
Granville, Ohio	39.8	64	12	1.45
Lafayette, Ind	37.6	65	7	1.44
Fort Wayne, Ind	39.8	68	10	1.56
Logansport, Ind	40.4	70	10	1.82
Laconia, Ind	44.2	67	16	1.04
Terre Haute, Ind	41.1	64	16	.....
Sunman, Ind	39.5	62	9	1.03
Jeffersonville, Ind	49.6	67	17	1.65
Spiceland, Ind	38.5	65	9	1.31
Vevay, Ind	45.1	70	16	1.13
Wabash, Ind	38.6	64	10	1.64
Monticello, Ind	37.8	60	11	1.40
Frankfort, Ind	37 5	62	9	1.54
Attica, Ind	37.1	58	10	.....
Connersville, Ind	39.0	66	10	1.79
Noblesville, Ind	38.5	60	10	2.83
Greenfield, Ind	37.6	63	10	.....
Franklin, Ind	40.1	68	11	1.56
Crawfordsville, Ind	.....	64	10	3.00
Farmland, Ind	39.2	66	10	1.47
Mauzy, Ind	34.2	59	9	1.70
Romney, Ind	38.1	66	8	1.79
Dana, Ind	37.7	68	10	1.28
Richmond, Ind	39.3	65	11	1.76
Columbus, Ind	41.8	69	12	2.02
Blue Lick, Ind	43.8	66	13	1.97
Marengo, Ind	44.1	78	18	3.10
Huntingburg, Ind	43.1	66	16	2.01
Princeton, Ind	41.9	66	14	1.30
Worthington, Ind	40.8	68	12	1.83
Degonia Springs, Ind	43.9	70	16	1.91
Salem, Ind	42.3	68	13	2.31
Corydon, Ind	43.5	75	10	0.93
Mitchell, Ind	40.6	70	15	.....
Tipton, Ind	40.0	63	10	.....
Mattoon, Ill	42.0	73	11	1.83
Sycamore, Ill	32.8	62	0.7	2.48
Sandwich, Ill	35.6	65	0	1.46
Wilton Centre, Ill	35.5	69	4	1.48
Peoria, Ill	41.8	68	16	2.19
Anna, Ill	47.4	71	16	2.58
Bunker Hill, Ill	.....	76	12	1.86
Rockford, Ill	34.4	65	- 1	1.99
Riley, Ill	32.8	63	-1.6	1.79
Embarras, Wis	31.9	62	- 10	2.60
Sussex, Wis	33.4	35	- 6	1.97
Beloit, Wis	32.2	62	-1.5	1.72
Neillsville, Wis	22.0	48	-22	0.26
Madison, Wis	32.2	60	- 5	1.53
Prairie du Chien, Wis	31.2	62	-6.9	1.70
Minneapolis, Minn	27.0	59	-13	0.66
Northfield, Minn	28.7	60	-12	0.60
Fort Snelling, Minn	28.1	61	-15	0.45
Chester, Minn	.....	57	-22	0.65
Monticello, Iowa	32.0	62	- 2	1.59
Des Moines (near) Iowa	35.8	66	- 3	.....
Indianola, Iowa	37.5	65	4	1.19
Independence, Iowa	32.0	54	0	1.10
Ottumwa, Iowa	36.8	70	6	1.21
Manchester, Iowa	34.2	62	- 4	1.12
Logan, Iowa	38.6	64	0	0.10
Oskaloosa, Iowa	.....	65	9	.....
Cedar Rapids, Iowa	32.9	64	- 5	1.37
Fort Madison, Iowa	.....	60	10	1.90
Guttenberg, Iowa	30.2	62	- 8	0.66
Muscatine, Iowa	35.8	68	5	1.57
West Union, Iowa	30.0	62	-10	0.51
Maynard, Iowa	26.5	58	-14	.....
Mount Vernon, Iowa	34.7	67	*0	.....
De Soto, Nebr	35.2	65	3	0.12
Fremont, Nebr	34.7	58	1	0.21
Genoa, Nebr	30.0	67	- 1	0.05
Tecumseh, Nebr	41.0	70	6	0.02
Crete, Nebr	36.6	69	2	0.02
Marquette, Nebr	44.6	.....	.....	.....
Fort Robinson, Nebr	37.5	73	- 8	0.15
Falls City, Nebr	42.0	.....	.....	1.00
Syracuse, Nebr	39.2	.....	.....	0.25
Weeping Water, Nebr	35.9	.....	.....	0.00
Central City, Nebr	33.0	.....	.....	0.00
DeWitt, Nebr	36.2	.....	.....	0.20
Nebraska City, Nebr	36.8	.....	.....	0.27
Stromsburg, Nebr	37.4	.....	.....	0.11
Madison, Nebr	41.4	72	2	.....
Table Rock, Nebr	36.2	.....	.....	0.40
West Hill, Nebr	35.2	.....	.....	0.05
Superior, Nebr	39.2	.....	.....	.....
Yutan, Nebr	36.5	65	1	0.02
Sargent, Nebr	33.3	.....	.....	0.10
Booneville, Mo	39.0	69	10	0.95
Greenfield, Mo	47.0	78	20	2.10
Springfield, Mo	45.6	73	17	3.03
Centreville, Mo	.....	74	9	1.30
Chamois, Mo	44.3	74	18	2.00
Dresden, Mo	40.9	68	12	2.00
Glasgow, Mo	42.7	66	16	2.27
Harrisonville, Mo	47.3	73	18	1.87
Ironton, Mo	44.0	76	15	2.15
Mascoutah, Ill	40.9	75	17	2.40
Kirksville, Mo	40.1	68	10	1.08
Lexington, Mo	40.9	67	12	1.51
Louisiana, Mo	40.8	68	10	1.30
Mexico, Mo	.....	68	13	2.00
Miami, Mo	42.0	70	12	1.64
Oregon, Mo	41.1	72	5	0.72
Steelville, Mo	.....	.....	.....	2.87
Phelps City, Mo	39.1	68	3	.....
Saint Charles, Mo	.....	.....	.....	1.65
Pro Tem, Mo	47.4	85	16	4.71
Atchison, Kans	40.6	68	8	1.30
Independence, Kans	45.6	73	16	2.58
Wyandotte, Kans	40.0	67	13	1.15
Salina, Kans	42.0	55	14	0.08
Yates Centre, Kans	39.5	65	12	1.62
Emporia, Kans	43.3	69	9	1.93
Clay Centre, Kans	40.5	82	9	1.28
W. Leavenworth, Kans	41.5	71	12	1.45
Maud, Kans	41.0	73	9	2.06
Wellington, Kans	42.9	74	14	1.85
Allison, Kans	34.5	80	4	0.13
Lawrence, Kans	41.5	70	10	0.80
Sherlock, Kans	41.0	86	12	0.24
Holton, Kans	41.0	73	10	1.40
Richardton, Dak	30.1	58	-19	0.70
Fort Yates, Dak	29.2	68	-21	0.54
Fort Buford, Dak	28.6	62	-12	1.32?
Fort Totten, Dak	23.9	61	-21	0.25
Fort Sisseton, Dak	27.2	62	-22	0.52
Fort Sully, Dak	34.2	72	- 7	0.17
Fort Randall, Dak	35.5	78	- 4	0.04
Fort Pembina, Dak	23.6	58	-19	2.25?
Fort A. Lincoln, Dak	27.6	65	-15	0.80
Fort Meade, Dak	37.0	71	-12	0 53
Vermilion, Dak	35.0	66	- 5	trace
Pueblo, Colo	30.5	67	16	0.05
Fort Lewis, Colo	35.1	60	12	trace
Fort Lyon, Colo	40.1	74	7	0.20
Tucson, Ariz	.....	.....	.....	0.34
Fort Keogh, Mont	33.3	69	-24	0.26
Fort Ellis, Mont	35.2	67	- 1	0.00
Fort Shaw, Mont	39.5	68	- 4	0.84
Fort Assinaboine, Mont	30.6	70	-15	0.42
Fort Fred Steele, Wyo	31.8	62	2	0.16
Fort Bridger, Wyo	34.7	55	14	0.03
Fort Union, N. Mex	43.5	67	14	trace
Fort Wingate, N. Mex	42.0	59	13	trace
Nephi, Utah	33.2	63	16	0.00
Carson City, Nev	38.7	66	14	0.00
Fort McDermit, Nev	41.2	66	21	0.00
Poway, Cal	54.6	87	33	0.38
Blue Lake, Cal	50.9	69	33	1.37
Cahuenga Valley, Cal	.....	.....	.....	1.17
Hydesville, Cal	54.5	70	40	0.69
Princeton, Cal	50.4	78	32	.....
Salinas, Cal	.....	.....	.....	.....
Oakland, Cal	55.4	70	42	0.05
College City, Cal	53.9	78	32	0.69
Sacramento, Cal	51.3	74	31	trace
Alcatraz Island, Cal	55.4	70	48	0.05
Angel Island, Cal	57.2	76	46	0.35
Benicia Barracks, Cal	50.5	69	43	0.01
Fort Bidwell, Cal	46.0	70	29	trace
Fort Gaston, Cal	49.7	73	35	0.84
Presidio of S. F., Cal	55.4	71	44	0.19
Fort Mason, Cal	56.2	71	40	1.14
Eola, Oreg	44.7	59	30	2.83
Bandon, Oreg	.....	61	33	3.93
Albany, Oreg	47.4	66	36	2.18
East Portland, Oreg	.....	.....	.....	.....
Fort Klamath, Oreg	.....	.....	.....	.....
Pleasant Grove, Wash. T	.....	56	15	0.16
Bainbridge Isl'd, Wash. T	47.2	62	31	2.55
Fort Spokane, Wash. T	.....	.....	.....	.....
Fort Townsend, Wash. T	47.3	63	28	0.39
Ainsworth, Wash. T	.....	.....	.....	.....
New Tecoma, Wash. T	45.7	61	29	1.84
Kenwick, Wash. T	.....	56	24	0.44

Mountainville, New York, 11th.
Wauseon, Ohio, 14th, 26th.
Portland, Oregon, 5th.
Nashville, Tennessee, 21st, 22d, 24th, 25th.
Rio Grande City, Texas, 23d.
El Paso, Texas, 26th.
Wytheville, Virginia, 25th, 29th.
Dale Enterprise, Virginia, 25th, 27th.
Prairie du Chien, Wisconsin, 9th.
Fort Bridger, Wyoming, 23d, 26th.

WATER SPOUTS.

The following note is from the "Galveston (Texas) News," of November 30th, 1884:

On Thursday evening just before the "norther" struck the city, a fearful water spout made its appearance in the channel just in front of the quarantine station. The water ascended in the shape of a cone, with the apex downward, to a height of one hundred yards, and at the top, had the appearance of being from sixty to seventy yards in diameter. In descending the water struck the wharf and the cones of the quarantine station with great force, but caused no damage.

SAND STORM.

Fort McDowell, Arizona, 8th.

NOTES AND EXTRACTS.

The following is the November bulletin of the Alabama Weather Service, Prof. P. H. Mell, jr., Director:

The precipitation for the three months of autumn was nearly eight inches below the average for the state.

The temperature for the same time was about normal. The high averages of September and October were neutralized by the low average of November.

The first four days of November were mild and pleasant; on the 5th the Chief Signal Officer predicted frost, the temperature fell twenty or twenty-five degrees and a heavy frost is reported from all sections; several days of cool weather followed, but from the 10th to the 18th there was a week of beautiful hazy Indian summer; the temperature then decreased, and the cold wave predicted by the Chief Signal Officer reached the state on the 24th and 25th; the last four days were warmer but frost is reported from many stations. The temperature for the state was about three degrees below the normal.

The precipitation for the month was two inches below the average. There were sixteen days without rain; a few showers occurred on the 4th, and from the 18th to the 30th the weather was frequently showery.

State summary.

Mean temperature, 51°.5; highest temperature, 82° at Newton on the 4th; lowest temperature, 15° at Calera on the 7th; range of temperature, 67°; greatest monthly range of temperature, 55° at Bolling and 62° at Calera; least monthly range of temperature, 37° at Wetumpka; greatest daily range of temperature, 45° at Bolling on the 12th, 54° at Calera on the 9th; least daily range of temperature, 0° at Mountain View on the 19th, and 8° at Birmingham on the 18th.

Mean depth of rainfall, 2.44 inches; mean daily rainfall, 0.081 of an inch; greatest depth of monthly rainfall, 4.65 inches at Bolling; least depth of monthly rainfall, 0.25 at Mountain View; greatest daily average rainfall for the state, 0.65 of an inch, on the 28th; greatest daily rainfall, 2.75 inches at Summerville on the 28th.

Days of general rainfall, 18th, 22d, 23d, 25th, 27th, 28th; average number of days on which rain fell, 6; average number of cloudy days, 9; average number of fair days, 9; average number of clear days, 12; warmest days, 3d and 4th; coldest days, 24th and 25th.

Prevailing direction of the wind, northwest.

Prof. W. H. Ragan, of Greencastle, Indiana, furnishes the following meteorological summary for the state:

Districts.	Temperature.			Precipitation for November, 1884.
	Highest.	Lowest.	Monthly mean.	
	°	°	°	
Northern counties	70	10	38.4	3.40
Central counties	68	8	39.2	3.10
Southern counties	78	10	42.8	0.70
State	78	8	40.1	3.03

The following is the November bulletin of the Iowa Weather Service, Gustavus Hinrichs, Director:

November, 1884, was nearly normal in temperature, fair and dry, westerly winds and calms prevailing.

The mean temperature of the air was 0°.5 above normal. The first two decades were warm, averaging 2°.5 above normal; fine clear and warm, hazy Indian summer days were numerous, and hardly any rain fell. The last decade was cold, being over 3° below the normal; during the evening of the 22d the first blizzard of the winter set in, lowering the temperature of the air 36°, turning the rain-storm into a snow-storm, and making the next day, the 23d, the first real winter day of the season.

During the first two decades of the month, the prevailing bright sunshine averaged 103° on the sun thermometer, 46° in excess of the temperature of the air at noon. During the cold cloudy third decade, the sun thermometer averaged only 80°, or 34° above the air temperature at noon.

Dense and extended fogs occurred on the 11th and 12th. The principal and almost the only precipitation throughout the state took place on the 22d, as rain turning into snow as the high wind from the northwest cooled the air.

The fall season now closed, comprising the months September, October, and November, has been remarkably fine and warm, without notable storms, and giving abundant warmth to ripen our late (corn) crop, and for all fall work. Roads have been excellent throughout Iowa.

The winter now beginning will probably be a moderate or mild one for Iowa; the chances that it may prove severe are certainly less than one in fifty, according to all results obtained during the past forty-five years of observations. It should not be overlooked, however, that our Iowa winters normally contain sixteen days on which the temperature reaches down to zero, Fahrenheit.

Prof. H. A. Huston, of Lafayette, Indiana, furnishes the following meteorological summary for the state, with the accompanying remarks:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Monthly mean.	
	°	°	°	
Northern counties	70	10	38.6	1.61
Central counties	72	7	39.5	1.61
Southern counties	78	10	44.2	1.95
State	78	7	40.8	1.72

Atmospheric pressure.—Mean for the state 30.10 inches; highest 30.53 at Indianapolis, on the 6th; lowest 29.37 at Wabash, on the 23d; station reporting highest monthly mean, Vevay, 30.14; station reporting lowest monthly mean, Wabash, 30.02.

Temperature.—Mean for the state 40°.8 is 2°.5 below that for November, 1883. The maximum temperature, 78°, occurred at Marengo; minimum temperature, 7°, occurred at Lafayette.

Precipitation.—Average for the state 1.72 is 3.31 below that for November, 1883. The large monthly rainfall, 3.10, occurred at Marengo; the least monthly rainfall, 0.93, occurred at Corydon.

The following are extracts from the November bulletin of the Louisiana Weather Service, Mr. Robert S. Day, Director:

The temperature for the month has been comparatively cool, but the frosts, which were general outside the country contiguous to New Orleans, were not severe enough to do injury in the sugar region. The yield of cotton was checked by the cool weather of October 28th. The cold waves of the 6th, 9th, 20th, and 29th came from the northwest with the customary speed and severity, but "slowed up" and were materially modified in temperature after crossing into the swamp basin of lower Louisiana. Cold waves at New Orleans cannot be predicted with certainty for this reason, as they are sometimes delayed or dissipated in the swamp district or are deflected by the northeast winds. A cold wave from the north entered the northeast corner of the state on the 18th, but covered a small district. The rainfall continued below the average all over the state.

The predictions of the Signal Service proved correct, except in the country protected or influenced by the swamp basin.

State summary.

Mean temperature for November, 1884, 55.4°; highest temperature, Franklin, 1st, 82.5°; lowest temperature, Delta, 7th, 19.0°; greatest daily range, Delta, 10th, 50.0°; least daily range, Saint Joseph, 29th, 4.0°.

Average rainfall, 1.36 inches; greatest daily rainfall, 3.13 inches, Shreveport, 6th; greatest rainfall for month, 5.73 inches, Shreveport; average rainy days, 4.8; rainfall since December 1st, 1883, 55.47 inches.

River at New Orleans fell during the month one foot four inches; river at Shreveport rose during the month three feet ten inches.

Lunar halos: Red River Landing, 2d.

Storms: Thibodeaux, on 22d; Lafayette, 22d; New Iberia, 22d; Lake Providence, 22d.

Heavy frosts: Monroe, 20th. 21st, 24th; Lake Providence, 6th, 7th, 8th, 9th, 10th; Delta, 6th, 7th, 10th, 24th, 25th; Vidalia, 28th; Saint Joseph, 7th, 10th, 30th; Nachitoches, 7th, 8th, 9th, 21st; Alexandria, 7th, 8th, 9th, 29th; Chenyville, 7th, 8th, 9th, 29th; Red River Landing, 29th; Whiteville, 7th, 8th, 9th, 29th; Opelousas, 7th, 8th, 9th, 29th; New Iberia, 7th, 8th, 9th, 21st, 29th; Franklin, 7th, 8th, 9th, 10th; Lafayette, 7th, 8th, 9th, 29th; Thibodeaux, 7th, 8th, 9th, 29th, 30th; Donaldsonville, 28th, 29th; Houma, 7th, 8th, 9th,

29th; Baton Rouge, 28th, 30th; Canton, 7th, 8th, 9th, 10th, 11th, 21st, 29th; Shreveport, 7th, 20th, 24th.

Professor W. H. Payne, of Northfield, Minnesota, Director of the State Weather Service, reports the following:

The barometric pressure for November was higher than for October by a difference of .071 inch, and also .040 inch higher than for November, 1883.

The temperature of the air was 28°.7, or 20°.6 lower than for October, and 2°.2 colder than for November, 1883.

The precipitation (all in the form of snow) was below the normal, being only 0.60 inch, or 2.85 less than for October, and 0.40 less than for November, 1883; rain fell on only one day, viz: the 10th, and not in sufficient quantity to measure.

The following is the November bulletin of the Missouri Weather Service, Prof. Francis E. Nipher, Director:

The temperature and rainfall of November have both been near the normal values, the rainfall at the central station having been 2.19 (normal 2.95) and the temperature having been 45°.0 (normal 42°.8). In former years the November temperature has ranged from 32°.2 (1880) to 56°.5 (1848).

The extremes of temperature were 15°.6 on the 24th and 76° on the 16th. In the former years the lowest minimum ever observed was —0°.5 on November 28, 1845, and the highest maximum was 81°.5 on November 11th, 1837. In Saint Louis the first killing frost occurred on the morning of the 5th, the minimum temperature having been 30°.5. The temperature fell to or below 32° nine times during the month.

In the state the lowest minimum, 3°, is reported from Phelps City, the highest minimum being 22.2 at Cairo, Illinois. The highest maximum was 85°, near Pro Tem, in southern Missouri, and the lowest maximum was 66° at Glasgow. The highest mean was 48°.5 at Cairo, and the lowest was 39°.1 at Phelps City.

The rainfall was a little less than one inch in the northwest part of the state, increasing quite regularly to 4.7 in the extreme southern part.

The snowfall was from two to three inches in the north part of the state, and diminished to none in the south.

The first snow of the season fell on the 17th and 18th, beginning late on the 17th in the northwest part of the state and extending over the entire state, excepting the two southern tiers of counties, on the 18th.

Oregon reports the corn crop good, but the yield per acre is less than was expected owing to the bad stand. The yield is about average.

The observer at Steelville reports the occurrence of cloud shadows projected through haze on the evening of the 10th at 7 to 8 o'clock p. m. It was best defined about 7.20, after twilight had entirely disappeared. "It consisted of alternate dark and bright bands passing entirely across the heavens, terminating low down in the east in total darkness, and in a bright halo two to three degrees above the western horizon. Sky perfectly clear." The apparent convergence of these bands is due to perspective, they being really parallel. The phenomenon covered the entire heavens and was unusually well marked. Its occurrence so late in the evening is somewhat unusual, and was due to an unusual height of cloud and hazy atmosphere.

The following is from the November bulletin of the Nebraska Weather Service, Prof. Goodwin D. Swezey, Director:

Never since our weather service has been established has November been so dry, reaching this year only one-ninth the normal amount of precipitation.

There have been no hail or thunderstorms, almost no snow, and less than usual of fogs.

The weather has been rather warm, yet with more than usual of cold nights and frosty mornings, and more than the normal number of decidedly clear and of decidedly cloudy days.

Rainfall.—The average rainfall for different sections of the state for November, 1884, is as follows: northeast section, 0.22 inch; southeast section, 0.21 inch; southwest section, 0.08 inch; northwest section, 0.06 inch.

The following summary is from the November bulletin of the Ohio Weather Service, Prof. T. C. Mendenhall, Director:

Mean barometer, 30.118 inches; highest barometer, 30.538 inches on the 6th at Cincinnati; lowest barometer, 29.349 inches on the 23d at Wauseon; range of barometer, 1.189 inches.

Mean relative humidity, 78.7 per cent. Mean temperature, 39°.4; highest temperature, 78°.0, on the 1st at Ironton; lowest temperature, 4°.7, on the 24th at Wauseon; range of temperature, 73°.3; mean range of temperature, 20°.0; greatest daily range of temperature, 48°.0, on the 10th at Ironton; least daily range of temperature, 1°.5, on the 29th at Hiram.

Average number of clear days, 10.1; fair days, 8.7; cloudy days, 11.3; days on which rain fell, 8.7; greatest number of days on which rain fell, 14., at Columbus; least number of days on which rain fell, 4, at Ironton.

Mean rainfall, 1.39 inches; average daily rainfall, .046 inch; greatest rainfall, 2.78 inches at New Bremen; least rainfall, .68 inch at Washington C. H.

Prevailing direction of wind, southwest.

The following is the November bulletin of the Tennessee Weather Service, Hon. A. J. McWhirter, Director:

The month of November was devoid of any special meteorological features, with the exception of the high winds, which prevailed throughout the state on the 22d and 23d, a slight shock of earthquake in the extreme western portion of the state on the 29th, and the very small amount of rainfall.

The mean temperature for the month was 45°.1, 4°.32 below the November mean of last year, and 18°.63 below the mean for October. The mean of maximum temperatures was 71°, 2°.7 below, and the mean of minimum temperatures was 23°.3, 6°.7 above the November means of last year. The highest temperature was 76°, 6° below the November maximum of last year, and the lowest was 17°, 7° above the November minimum of last year. The range of temperature was 56°, 6° less than that for November, 1883. The highest temperature was general about the 1st and 3d, and the lowest about the 24th.

The mean depth of rainfall was 1.56 inches, 2.66 inches less than the mean for November of last year, which was perhaps slightly above the normal. The rainfall was very evenly distributed throughout the state, only four stations showing a less amount than one inch, and only four showing a greater amount than two inches. It was perhaps the most evenly distributed precipitation in the meteorological history of the state. The days of the greatest rainfall were the 4th, 18th, 22d, 23d and 28th. The rain of the 22d was confined almost exclusively to the western division—the others were general. The greatest local daily rainfall was 2.50 inches, on the 27th, at Quarter. There were sixteen rainless days during the month.

The month was free from electrical disturbances, no thunder being reported, and distant lightning only once, on the evening of the 22d, at Somerville.

The frequency of frosts was quite a feature during the month, only a few days being exempt. From the 1st to the 17th was almost an unbroken succession, some of them being reported very heavy.

State summary.

Mean temperature, 45°.1; highest temperature, 76°, on the 2d and 3d, at Howell, and on the 10th at Riddleton; lowest temperature, 17°, on the 8th, at Sunbright; range of temperature, 56°; mean monthly range of temperature, 47°.76; greatest monthly range of temperature, 55°, at Riddleton; least monthly range of temperature, 40°, at Greeneville; mean daily range of temperature, 21°.34; greatest daily range of temperature, 45°, on the 10th, at Riddleton; least daily range of temperature, 1°, on the 19th, at Howell, and on the 28th at Grief; mean of maximum temperatures, 71°; mean of minimum temperatures, 23°.3.

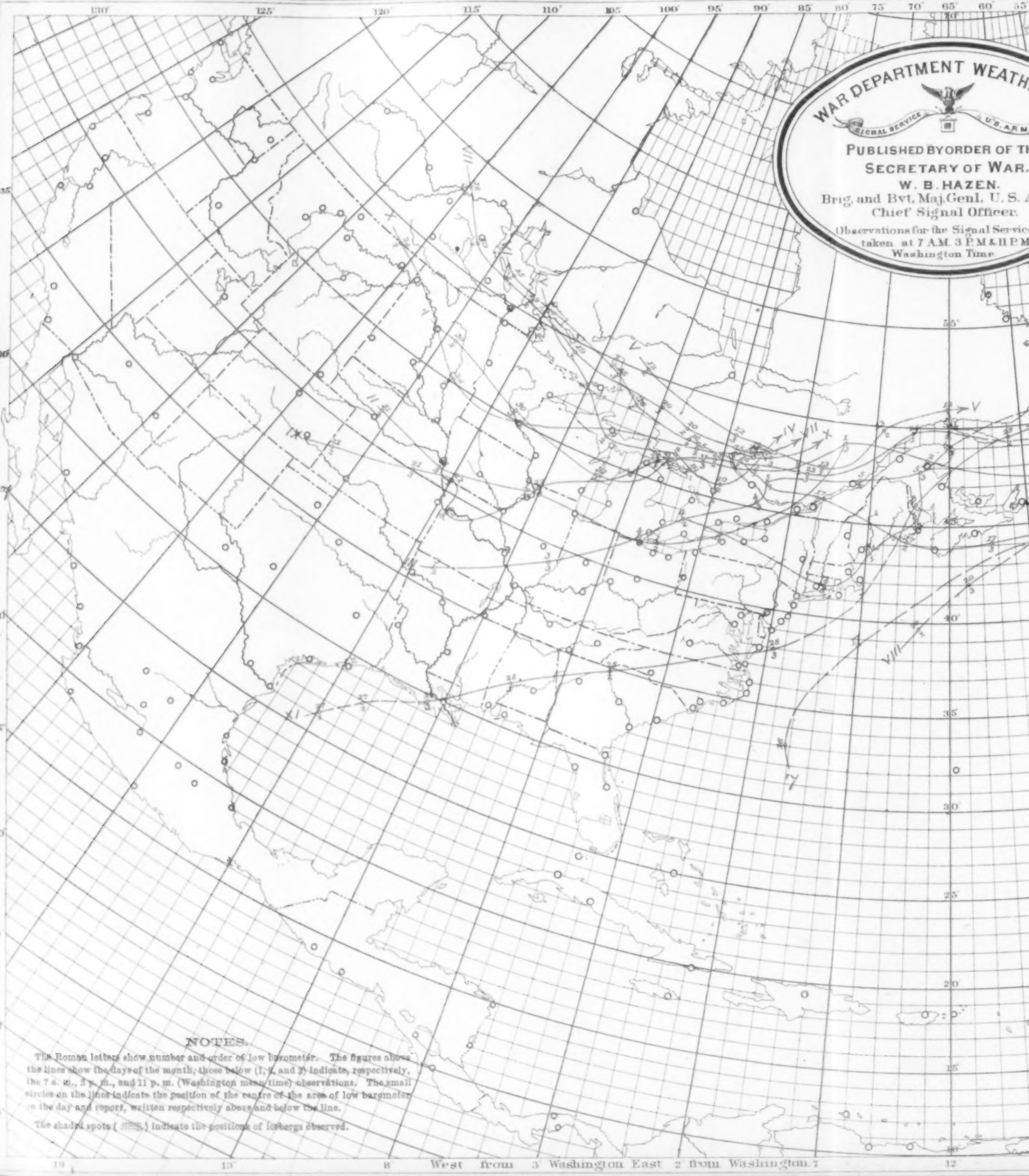
Mean depth of rainfall, 1.56 inches; mean daily rainfall, .050 inch; greatest rainfall, 4.10 inches, at Quarter; least rainfall, .30 inch, at Greeneville and Sunbright; greatest local daily rainfall, 2.50 inches, on the 27th, at Quarter.

Days of greatest rainfall, 18th, 23d, 28th, and 29th; average number of days on which rain fell, 5; average number of clear days, 16; average number of fair days, 7; average number of cloudy days, 7.

Prevailing direction of wind, north.

Form 106 C 1884.

Chart I. Tracks of Low-Barometer Ar

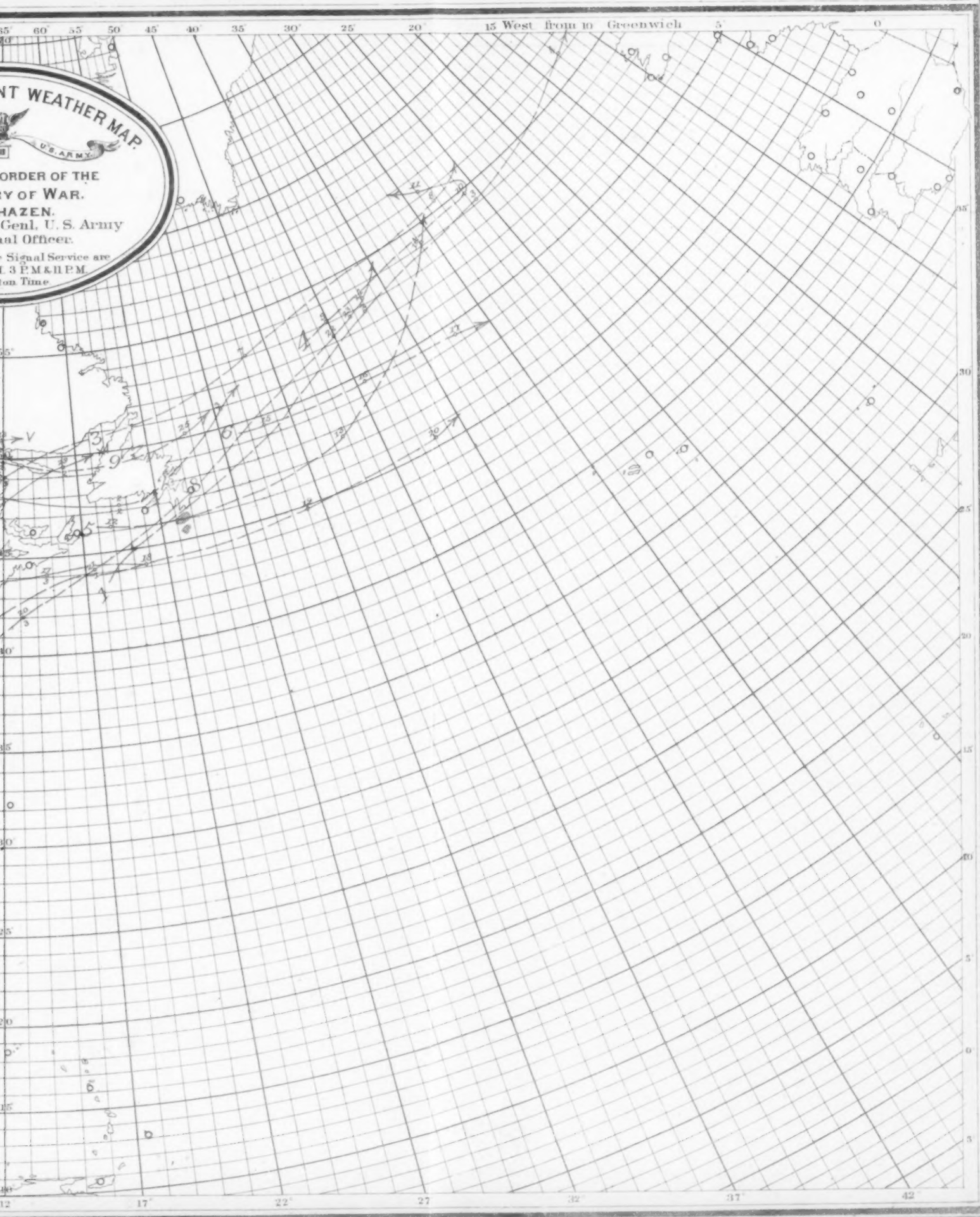

WAR DEPARTMENT WEATH
SIGNAL SERVICE
U.S. ARM
PUBLISHED BY ORDER OF TH
SECRETARY OF WAR.
W. B. HAZEN.
Brig. and Bvt. Maj. Genl. U. S. A
Chief Signal Officer.
Observations for the Signal Service
taken at 7 A.M. 3 P.M. & 11 P.M.
Washington Time
130° 125° 120° 115° 110° 105° 100° 95° 90° 85° 80° 75° 70° 65° 60°
55° 50° 45° 40° 35° 30° 25° 20°
I II III IV V VI VII VIII IX X XI

NOTES.

The Roman letters show number and order of low barometer. The figures above the lines show the days of the month; those below (I, II, and III) indicate, respectively, the 7 a. m., 3 p. m., and 11 p. m. (Washington mean time) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

The shaded spots (▒▒▒) indicate the positions of icebergs observed.

19 13 8 West from 3 Washington East 2 from Washington 7 12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U.S. ARMY.
ORDER OF THE
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HAZEN.
Genl, U. S. Army
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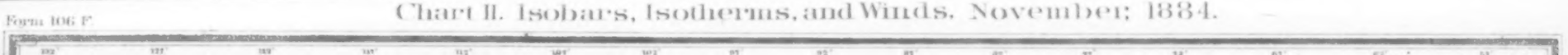
Signal Service are
1. 3 P.M & 11 P.M.
ton Time
15 West from 10 Greenwich
65° 60° 55° 50° 45° 40° 35° 30° 25° 20° 15 10 5 0
12 17 22 27 32 37 42

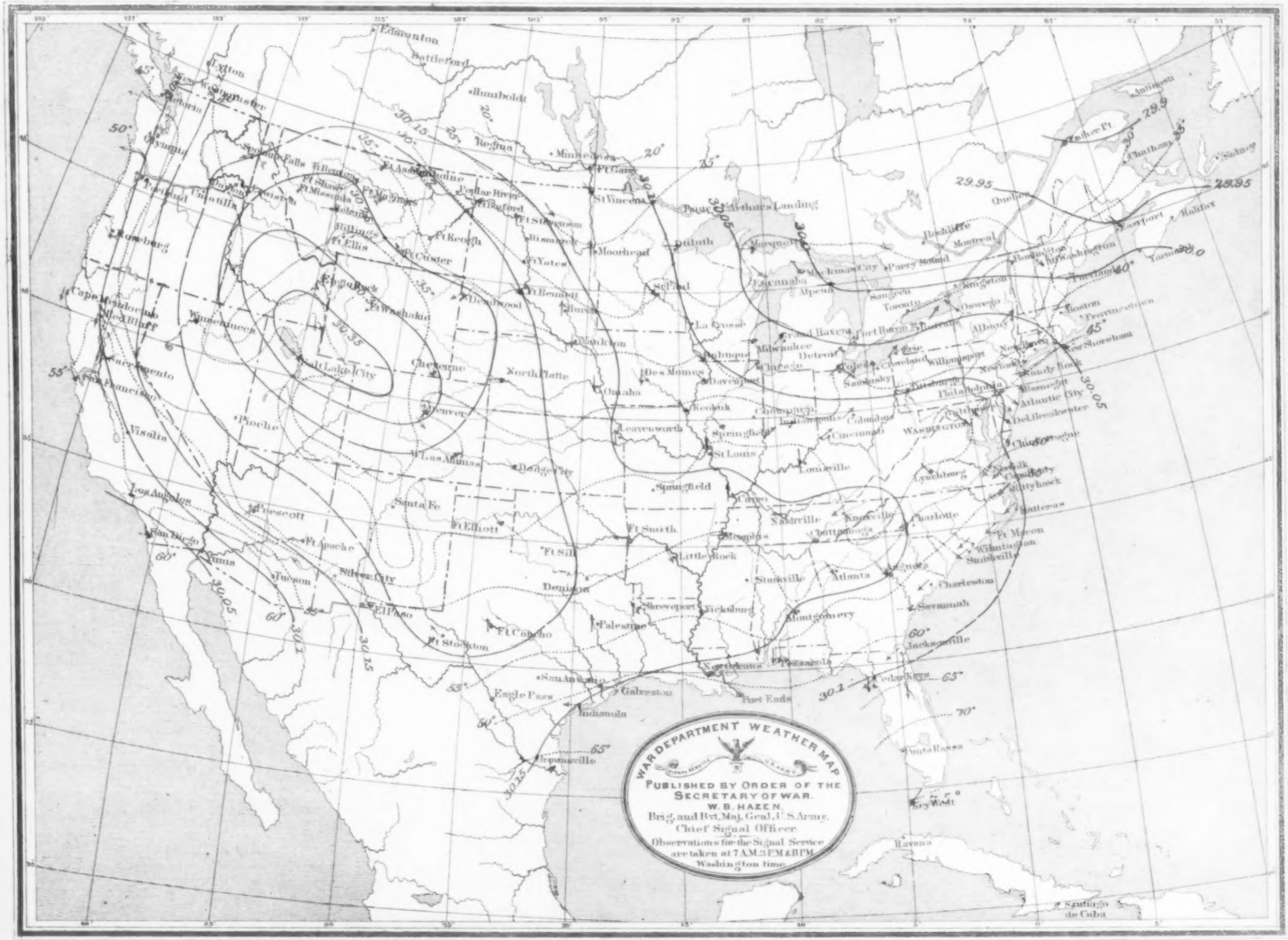
Form 106 F.

Chart II. Isobars, Isotherms, and Winds. November; 1834.



Form 106 F.

Chart II. Isobars, Isotherms, and Winds. November; 1884.

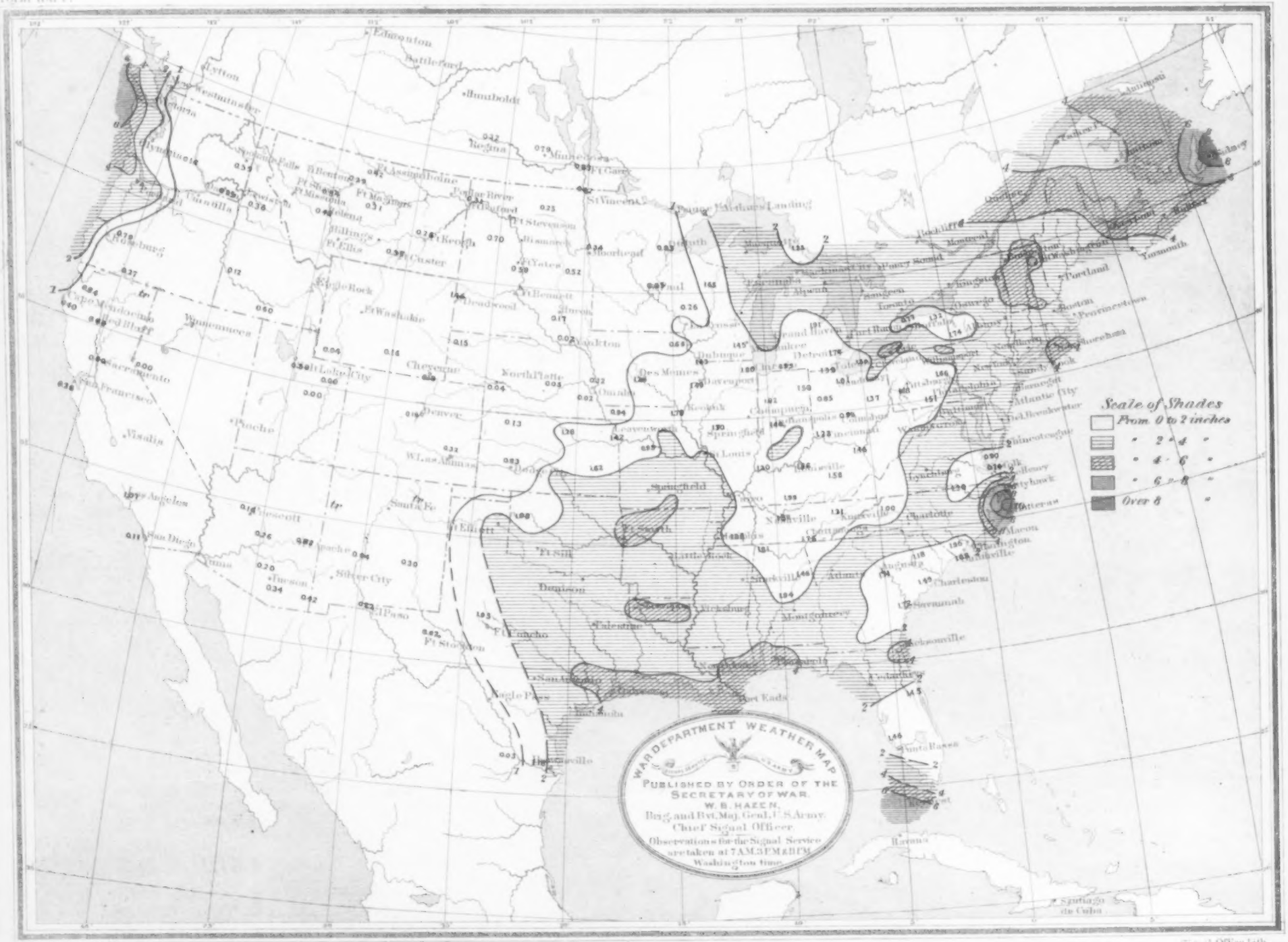


Signal Office Lith.

Chart III. Precipitation, November; 1884.

Form 106 F.

Chart III. Precipitation, November; 1884.


Scale of Shades
From 0 to 2 inches
" 2 " 4 "
" 4 " 6 "
" 6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.

Signal Office Lith.

Chart IV. Departures from Normal Atmospheric Pressure and Temperature. November, 1884.

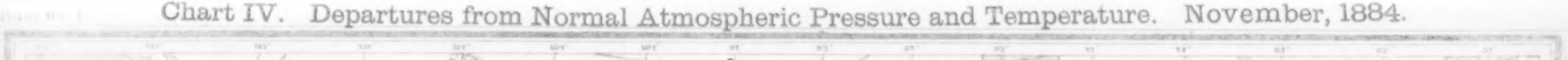
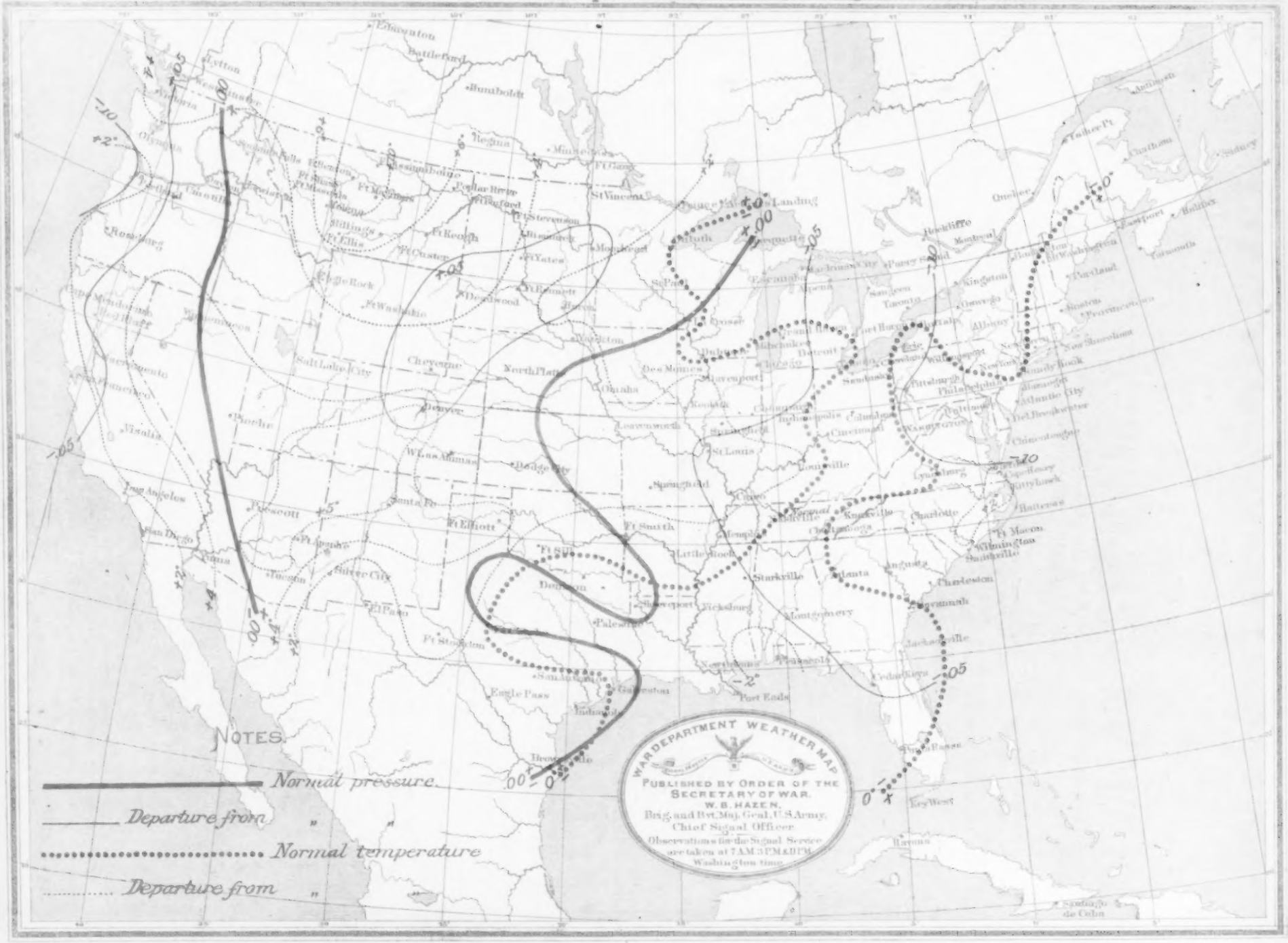


Chart IV. Departures from Normal Atmospheric Pressure and Temperature. November, 1884.


NOTES.
Normal pressure.
Departure from "
Normal temperature
Departure from "
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